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DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

FEDERAL AID IN FISH RESTORATION

Job Performance Report

Project F-71-R-13

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS

Job No. 5-b.	Region 5 Lowland Lakes and Reservoirs Investigations
Job No. 5-c.	Region 5 Rivers and Stream Investigations- Upper Blackfoot System Fishery Management Plan
Job No. 5-d.	Region 5 Technical Guidance

By

Daniel J. Schill, Regional Fishery Biologist
Larry D. La Bolle, Regional Fishery Manager

March 1990

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Job No. 5-d. _ Region 5 Technical Guidance

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JOB PERFORMANCE REPORT

State of: **Idaho**

Name: **REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS**

Project No.: **F-71-R-13**

Job No.: **5-b**

Title: **Region 5 Rivers and Streams Investigations**

Period Covered: **July 1, 1987 to June 30, 1988**

ABSTRACT

Growth rates, exploitation, and stock structure of largemouth bass were examined on four Franklin County waters. With the exception of early age-classes (1-3), bass in southeastern Idaho appear to grow at rates similar to those reported in northern Idaho. Overall, Region 5 bass growth rates are virtually identical to mean values reported for midwestern states at similar latitude.

Proportional Stock Densities (PSDs) for Winder and Glendale Reservoirs were calculated at .12 and .10, respectively, values well below the .30 to .40 management standard for yield fisheries. However, PSD's on Condie and Twin Lakes Reservoirs are at or near the standard at .31 and .25, respectively.

Exploitation ranged from 28 to 56% on Twin Lakes and Glendale Reservoirs. Although a statistical analysis was not feasible, there appeared to be a consistent relationship between exploitation and PSD on the four study reservoirs.

An estimated 1,051 largemouth bass in excess of 150 mm, or 22 fish/hectare, were in Condie Reservoir prior to opening of the angling season on May 28. These results indicate that Condie Reservoir bass densities lie near the mid-range reported for other Idaho populations. Bass biomass (fish >150 mm) was estimated at 507 kg, or 10.7 kg/hectare.

Check station results indicate that car counts may be an alternative to standard angler counts in estimating angler use. We found a highly significant relationship between the number of axle counts on a lone access road and known angler effort for eight days on Condie Reservoir ($r = 0.90$, $P < .005$).

Return-to-the-creel estimates for hatchery rainbow trout in the four study reservoirs was poor, ranging from a low of 9X on both Twin Lakes and Winder Reservoirs, to a high of 26% on Glendale Reservoir. Return estimates using reward and non-reward tags (assuming 50% non-compliance) were similar.

Authors:

Daniel J. Schill
Regional Fisheries Biologist

Larry D. La Bolle
Regional Fisheries Manager

OBJECTIVES

1. To assess growth rates, exploitation, abundance, stock structure, and overall status of largemouth bass populations in Region 5 reservoirs.

2. To begin developing relationships between bass exploitation and angler harvest in southeast Idaho reservoirs.

3. To evaluate car counter as a method of estimating angler use on Region 5 reservoirs.

4. To estimate performance (return-to-the-creel) of catchable rainbow trout planted in Region 5 reservoirs.

RECOMMENDATIONS

1. Include Winder and Pleasantview Reservoirs under the statewide 305 mm minimum size limit for largemouth bass.

2. Propose trophy bass regulations for Condie Reservoir with at least a 406 mm minimum size, and consider an additional water in the Malad area for similar regulations.

3. Conduct additional studies on Glendale Reservoir to determine if bass exploitation is, in fact, within the 50 to 60% range despite the existing 305 mm minimum size limit.

4. Conduct exploitation studies on additional Region 5 bass populations, with emphasis on waters receiving lower levels of angler effort than the reservoirs included in this study.

5. Sample age-0 largemouth bass from several Region 5 reservoirs in late fall to aid in the correct identification of annuli among growth checks.

6. Conduct several additional population estimates for largemouth bass populations in Region 5 to determine if results from Condie Reservoir are typical for southeast Idaho and to assess numbers available for angler harvest.

7. Consider funding graduate research on largemouth bass recruitment and the affects of severe spring drawdown on year-class strength formation and survival for a select group of Region 5 reservoirs.

8. Continue evaluations of car counts as a cost-effective method to estimate angler use on Idaho waters.

9. Conduct additional return-to-the-creel estimates on the four study waters using non-reward tags only, and expand the program to other regional waters, including streams.

Description of Study Area

Catchable rainbow trout evaluations and largemouth bass studies were conducted simultaneously on four reservoirs in Franklin County near Preston, Idaho (Figure 1). All four bodies of water were constructed by private irrigation companies, and water is stored and managed solely for agricultural purposes. Consequently, water drawdown on all four reservoirs can be quite severe, especially in low water years. Irrigation withdrawal typically begins in late May to early June and continues through September.

Condie Reservoir

Condie is a 47 hectare reservoir with a maximum depth of approximately 16 m at full pool (Heimer 1980). This reservoir is managed in concert with two additional bodies of water (Twin Lakes and Winder Reservoirs) by the Twin Lakes Canal Company. The primary source of water for this network is a siphon system originating in the Mink Creek drainage east of the Bear River.

Shoreline habitat for centrarchids in Condie Reservoir has been heavily impacted by vegetation removal and agricultural activities occurring within 1-2 m of the waterline on much of the reservoir. However, some excellent habitat does exist in the form of submerged macrophytes, willows, and woody debris, particularly in several large shallow bays. Despite the potential for heavy sediment input, water clarity on this reservoir is usually excellent.

Condie Reservoir supports populations of largemouth bass and bluegill *Lepomis macrocheilus*, both of which are popular with anglers. In addition, this reservoir is planted with approximately 15,000 to 20,000 catchable rainbow trout annually (320/hectare in 1987).

The current season on Condie runs from January 1 to February 28 and May 28 to December 31. The reservoir was exempted from the statewide minimum size limit for largemouth bass, and fish of all sizes may be creeled. Condie is popular with a small but persistent group of ice fishermen who typically access the reservoir via a 1.7 km snowmobile ride in the winter (Heimer and Schill 1987). Angler access during the remainder of the year is limited to a single access road with a small boat launching site. As a result, shore angler use is fairly light and concentrated near the parking area.

Twin Lakes

Twin Lakes is one of the largest private irrigation reservoirs in the region (181 hectares) and is comprised of two distinct basins partially isolated by a large island. Maximum depth of the reservoir at full pool is approximately 10 m, and water. quality in normal water years is sufficient to attract local recreational divers.

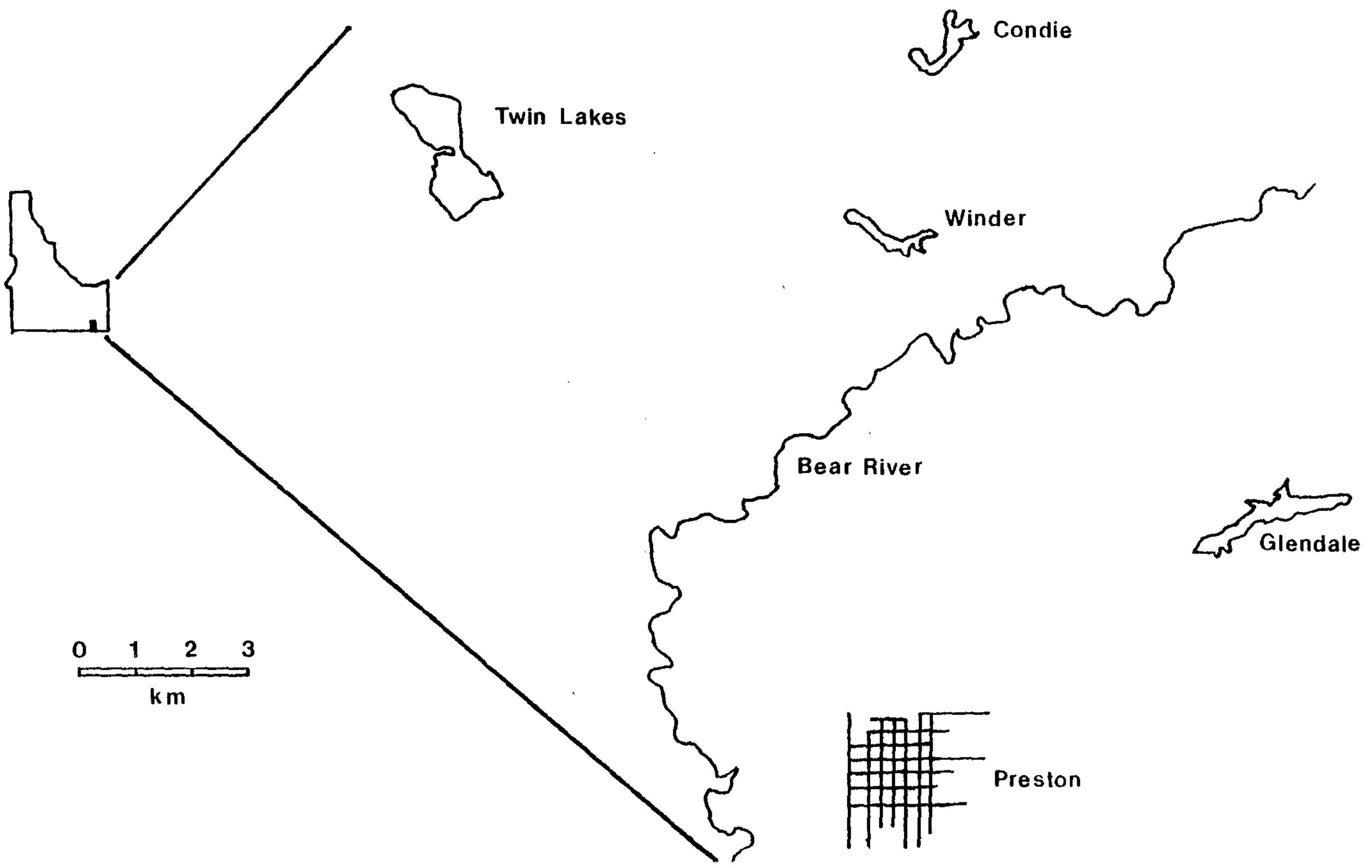


Figure 1. Location of Franklin County Reservoirs studied, May-September, 1989.

Shoreline habitat on Twin Lakes consists of a narrow band of mature cottonwood trees and extensive flooded willow stands extending up to 50 m into the reservoir during early spring. Like other area reservoirs, this habitat is dewatered by mid to late summer in normal water years. However, the more gradual substrate gradient and large size of willow stands probably provide better resilience to early spring drawdown.

Twin Lakes supports a largemouth bass population and has been well known locally for many years as a bluegill fishery due to the quality size of these fish. In recent years, however, anglers have reported a decline in size of fish. During recent electrofishing, we failed to collect any bluegill over age-3+ (Schill and Heimer 1988).

In addition to the centrarchid fishery, the reservoir is planted with 20,000 catchable rainbow annually at 110 fish/hectare. Fingerling rainbow have been planted in the past, but their contribution to the fishery has not been documented. Common carp Cyprinus carpio has been recently introduced into this water, either by illegal live bait fishing or through canal transfers.

The current angling season runs from May 28 to November 30, with general bag and length limits. The reservoir is virtually surrounded by undeveloped camping sites located within 5 m of the water surface, making this reservoir one of the region's most popular overnight fishing locations.

Winder Reservoir

Winder Reservoir is also owned by the Twin Lakes Canal Company and, at 38 hectares, is the smallest of the four reservoirs studied intensively in 1988. Much of the littoral zone contains good warmwater fish habitat in the form of extensive willow stands and a few scattered cottonwoods. The reservoir was treated in 1970 to remove nongame fish populations and control stunted centrarchids.

Winder Reservoir currently supports populations of largemouth bass, bluegill, several species of shiner, and a relatively rare exotic in Idaho, the green sunfish Lepomis cyanellus. In addition, approximately 4,000 catchable rainbow trout are planted annually (108 fish/hectare).

The season currently runs from May 28 to November 30, and five bass of any size may be creeled. Most of the shoreline is roaded, providing easy access for shoreline anglers. Local county ordinance has prohibited the use of boats on Winder, and as a result, past angler use has been limited to bank fishermen. Since the rise of "tube fishing" popularity approximately ten years ago, the lake has become popular with a dedicated following of "tubers" seeking refuge from powerboat lakes.

Glendale Reservoir

Glendale is a 93 hectare reservoir with a maximum depth of 22 m at full pool. Owned by the Preston-Whitney Canal Company, this reservoir is managed in concert with three nearby storage facilities, including Johnson, Foster, and Lamont Reservoirs. The primary water source for these bodies of water is via canal from the Worm Creek and Cub River drainages.

Much of Glendale's shoreline is covered by willow, cottonwood, and additional riparian vegetation. A significant portion of this habitat is flooded during spring and early summer. Early drawdown and the steep nature of the littoral substrate, however, eliminates much of this habitat quickly, even in normal water years.

Populations of largemouth bass, bluegill, and redside shiners Richardsonius balteatus exist in Glendale Reservoir, as well as an occasional mountain sucker, wild cutthroat trout Oncorhynchus clarki, and wild rainbow trout Oncorhynchus mykiss. The latter three species are presumably transported from the Cub River Drainage **via** the canal (Heimer 1980), although a very small number may reproduce in a small but heavily impacted tributary. Glendale Reservoir was treated with fintrol in 1974 to control Utah chub, and the above species have been re-introduced. In addition, the reservoir is planted with approximately 8,000 catchable rainbow trout annually (86 fish/hectare).

The current fishing season runs from May 28 to November 30, and general length and bag limits apply. The reservoir is nearly surrounded by a combination of both gravel and paved roads, facilitating easy access to much of the reservoir. This reservoir receives by far the most bass tournament pressure in the region and is popular with bass fishermen in general because of its camping facilities and relatively large size.

INTRODUCTION

Largemouth bass

Until recently, largemouth bass Micropterus salmoides populations in Idaho were considered underexploited and managed liberally (Rieman 1987). However, in the past 10 to 15 years angler interest in bass and their forage has increased dramatically. This heightened interest, along with the arrival of "bass clubs", points to the need for more intensive management of the species, often considered the most important gamefish in America (Martin 1974).

In response to perceived declines in bass fishing quality in northern Idaho by managers and anglers alike, an intensive research effort was initiated by Idaho Department of Fish and Game (IDFG) during the early 1980s (Rieman 1982, 1983, 1984). Results of this work indicate that total mortality was directly related to fishing and exploitation in northern Idaho waters (Rieman 1987). As a result of this work and the nationwide trend toward more restrictive regulation of bass harvest, a 305 mm minimum size limit was implemented on a statewide basis in 1986.

The suitability of this regulation for most Idaho waters, however, remains unknown because of the virtual absence of data on bass populations, particularly growth and exploitation information. In addition, four reservoirs in Region 5 were exempted from the statewide minimum size limit due to management concerns over possible stunting.

The purpose of this multi-year project was to begin assessing the overall status of Region 5 bass populations, particularly those exempted from the statewide length limit. Even though data were collected one to two years after the regulation change, much of the information will prove useful for future evaluation of the new minimum size limit.

Catchable Rainbow Trout Evaluation

In order to maintain acceptable catch rates for ever increasing numbers of anglers, hatchery production capacity in Idaho has increased dramatically in the last 20 years but is unlikely to continue in the future. Rising costs of production and the rising popularity of "specialty fish" have placed serious constraints on future expansion of the catchable trout program. For this reason, the development of streamlined stocking programs designed to maximize catchable trout returns will become an increasingly important priority for Idaho fishery managers.

Results of past evaluations in northern Idaho indicate that return-to-the-creel is highly variable for specific bodies of water. In addition, only modest gains in catch rates were achieved on large lakes (>300 ha) from a threefold increase in stocking rates. Return-to-the-creel also varies considerably with strain stocked (Maiolie 1987). This further complicates catchable evaluations at the regional or statewide level because of changes in production egg sources and strains.

Nearly every public access reservoir in Region 5 is currently planted with catchables. Despite the difficulty of maintaining good experimental design, an evaluation program is definitely warranted when considering the cost of these programs. A multi-year evaluation of the Region 5 catchable program was begun in 1988 with the eventual goal of directing heavy stocking to reservoirs with superior return rates. While reservoirs exhibiting low returns will probably not be cut from planting lists altogether, re-allocation of some fish to waters with higher returns should result in greater return, and eventually, higher angler satisfaction.

TECHNIQUES USED

Largemouth Bass

Largemouth bass populations on all four reservoirs were sampled in the spring using a Smith-Root electrofishing boat equipped with a 5,000 watt generator and stationary booms. All electrofishing was conducted at night to improve capture efficiency. We sampled Glendale Reservoir on May 26, two days before the general fishing season opener. Winder Reservoir was electrofished on June 1, five days after the opener. We doubled sampling intensity on Twin Lakes (May 24 and 25) and Condie Reservoirs (May 23 and May 31).

During each sampling effort, we made a complete pass around the entire shoreline and returned to the most productive areas when time permitted. We trailed **a** second boat for data collection and recording to maximize actual sampling time and minimize displacement of bass. Total lengths to the nearest millimeter were recorded for all bass collected, and a representative sample of weights (nearest 10 g) was obtained to construct a length-weight relationship.

Aging was conducted by scale analysis, with samples taken from the fish at the tip of the left pectoral fin. Scales from all fish larger than 280 mm were examined, but we subsampled smaller size classes (at least 10 from each 10 mm size group). Scales were read on a microfiche, and data were analyzed using the Apple DISBCALC program (Frie 1982). We back-calculated length-at-age and calculated average annual growth increments for bass from all four reservoirs. To determine age structure of the four populations, we constructed an age-length key and converted electrofishing length frequency distributions into age distributions.

We conducted a Peterson population estimate on Condie Reservoir. We completed the initial run on May 23 and marked all fish in excess of 180 mm with an opercle punch. We returned eight nights later and recorded the number of marked vs unmarked fish sampled. We used the modified Peterson formula to estimate total population size (Ricker 1975).

$$N = \frac{(M+1)\ (C+1)}{(R+1)}$$

Where N = Population estimate
M = Number of fish marked
C = Number of fish captured
R = Number of fish recaptured

The recapture run was completed four days after the opening of the angling season, hence a substantial number of marked fish were removed from the population. A known number of tagged bass were removed from Condie on two of these days because of check station operations (see car counter discussion below). We estimated the number of tagged bass removed on the remaining two days based on these results and adjusted the number of marked fish (M) accordingly before using the above formula.

We estimated exploitation on all four reservoirs using Floy tags placed on catchable-sized bass during electrofishing. On Glendale and Twin Lakes Reservoirs, we tagged all fish greater than 305 mm (minimum legal size). On Condie and Winder Reservoirs (no minimum size), we tagged all bass sampled that exceeded 250 mm in total length. All tags were sequentially numbered and marked "RTN IDFG." To estimate non-compliance on tag returns, we stamped a portion of the tags with a reward notice ($ Reward) in addition to the standard information. Exploitation was estimated using the following formula:

$$E = \frac{R}{M}$$

Where M = Number of fish tagged
R = Number of tags returned by anglers

On Condie Reservoir, we only used tags placed on bass prior to the angling season. On Winder Reservoir, where tagging was conducted after some harvest had occurred, we corrected the exploitation estimate as:

$$E_{Corr} \; \frac{Rc}{M}$$

Where $R_{Corr} = \frac{R}{P_A}$ and P_A = the proportion of effort occurring after tagging (Ricker 1975, Rieman 1987)

Fishing effort was estimated using angler counts on randomly selected days between the season opener (May 28) and September 16. We divided the census period into 14-day intervals and conducted angler counts (4 per day) on two weekend days and two weekdays in each interval. A more detailed discussion of calculations used to estimate total use per interval from angler counts is available in prior reports (Heimer 1985, Heimer et al. 1987). Angler counts were used to estimate effort on all bodies of water, with the exception of eight census days on Condie Reservoir where we employed car counters (see below description).

Because of the difficulty in contacting sufficient numbers of anglers during counts on multiple waters, and the availability of exploitation information from tags, we did not attempt to estimate total bass harvest on the four reservoirs. Because of the car counter evaluation on Condie Reservoir, however, sufficient information was available to estimate harvest of Condie bass and additional species during the initial month of the season. A detailed description of methods used to estimate harvest is available from prior regional reports (Heimer et al. 1986).

During the remainder of the season, we interviewed as many anglers as possible during counts to obtain cursory catch-rate data. In addition to harvest information, we asked anglers to specify the primary species sought (bass/bluegill or trout). A number of respondents were "just fishing" and had no preference. In this case we simply recorded anglers as fishing for both groups.

We used a dynamic pool model to evaluate the potential response of Condie Reservoir to special regulations. We constructed a catch curve from electrofishing data, obtained an estimate of fishing mortality (F) using exploitation information, and estimated natural mortality with the formula M - Z-F (Ricker 1975). We then varied F based on predicted exploitation of age-classes for the following regulation options:

current fishery
12" minimum
16" minimum
catch-and-release

Car Counter Evaluation

Recently, we have become interested in the feasibility of using car counters to estimate angler effort on Region 5 waters with limited access roads. During 1988, we selected Condie Reservoir as a test site because it has a single access road and virtually no overnight camping facilities. During eight days in May and June, we placed a pneumatic tube car counter on the access road and operated a check station concurrently. We typically opened the station at 0730 and closed after all anglers had left. We tested for a relationship between axle counts and known angler effort for the eight dates using linear regression.

Catchable Trout Evaluation

We placed number 8 monel jaw tags on catchables planted prior to the season opener to assess return-to-the-creel in the same four reservoirs discussed above. We solicited tag returns in conjunction with the bass exploitation study by placing signs around the reservoirs and by discussing the tagging program in the local media. In addition, we placed tag drop boxe

at popular area vendors.

A large percentage of anglers using these fisheries were nonresidents, and we suspected that non-compliance would be high. For this reason, we placed a relatively large sample (n = 100) of reward-tagged fish into each reservoir along with 150 non-reward tags. We did not specify the reward amount, but instead stamped each reward tag "$ Reward RTN IDFG". The large number of reward tags in these four reservoirs will hopefully give us an accurate account of angler non-compliance for Preston area reservoirs as a whole, and will also allow us to determine if the 50% non-compliance rate often used in the literature is applicable for future studies. We assumed 100% return of reward tags (an obvious over-estimate) when calculating return-to-the-creel. We estimated non-compliance using the following formula:

$$\text{Noncompliance} = \frac{\text{\% return of reward tags - \% return of non-reward tags}}{\text{\% return of reward tags}}$$

RESULTS

Largemouth Bass

Stock Structure

A total of 1,413 bass were collected during six nights of electrofishing. The majority of fish (64X) were collected on Condie and Twin Lakes Reservoirs because of greater sampling effort. These two reservoirs contained surprising numbers of fish in excess of 300 mm, and overall, had similar population structure (Figure 2). The average-sized bass collected on Twin Lakes and Condie Reservoirs was 279 and 287 mm, respectively. Calculated Proportional Stock Density (PSD) in these reservoirs (Twin = .25 and Condie= .31) was at or near the value (PSD $\geq$ .30) deemed suitable for a yield fishery (Paragamian 1982). However, other authors have suggested .4 as an appropriate PSD standard.

In contrast, we collected very few fish in excess of 300 mm from either Winder or Glendale Reservoirs (Figure 3). Bass in these reservoirs averaged only 230 and 232 mm, respectively. On Winder Reservoir, a much higher number of fish sampled were less than 200 mm than in any other sample. Whether this resulted from the apparent change in gear selectivity or stock structure is unknown. Calculated PSD for Winder and Glendale Reservoirs was far below the 0.30 standard at 0.12 and 0.09, respectively.

Average weight of bass collected on each reservoir was well below 454 g. However, we collected a number of bass from Condie in excess of 2 kg (Figure 4). Virtually 100% of these large fish were females in pre-spawning condition. The largest fish sampled during electrofishing was a 4,270 g female from Condie Reservoir.

Bass Densities and Biomass

We estimated a total population of 951 bass in excess of 150 mm in Condie Reservoir on May 31, 1988 (95% C.L. - 808-1156). Based on check station results, an estimated 100 bass were caught in the four days prior to the recapture event yielding a total pre-season population estimate of 1,051 bass, or 22 fish/hectare.

These results indicate that bass densities in Condie Reservoir lie near the mid-range of those reported for northern Idaho populations (Figure 5). Data for southern Idaho reservoirs subjected to yearly drawdown is sparse. However, electrofishing conducted during the past year on Paddock Reservoir, a 607 hectare reservoir also subjected to irrigation drawdown, yielded a density estimate of 14 bass/hectare (Holubetz and Mabbot, in press).

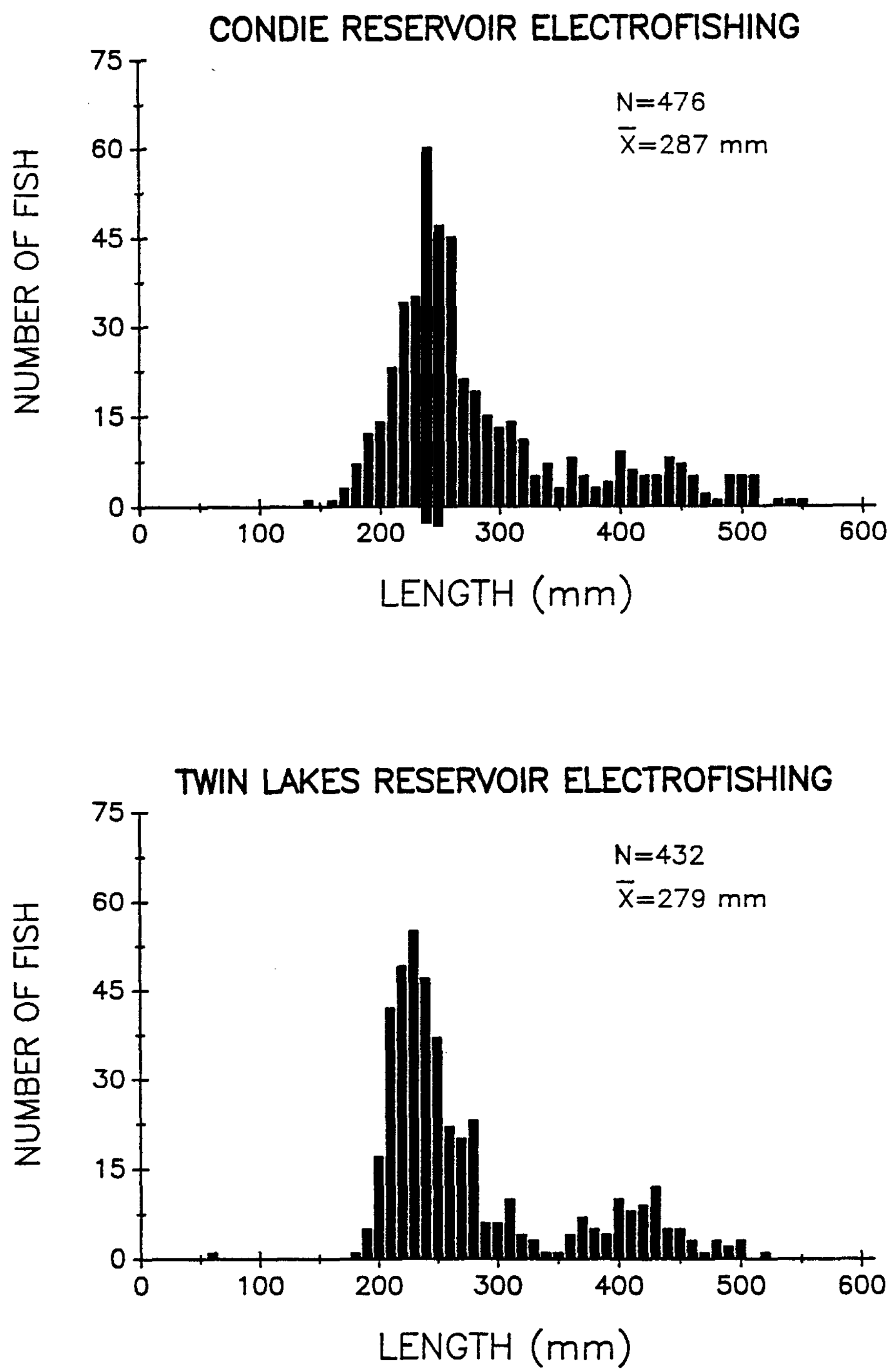
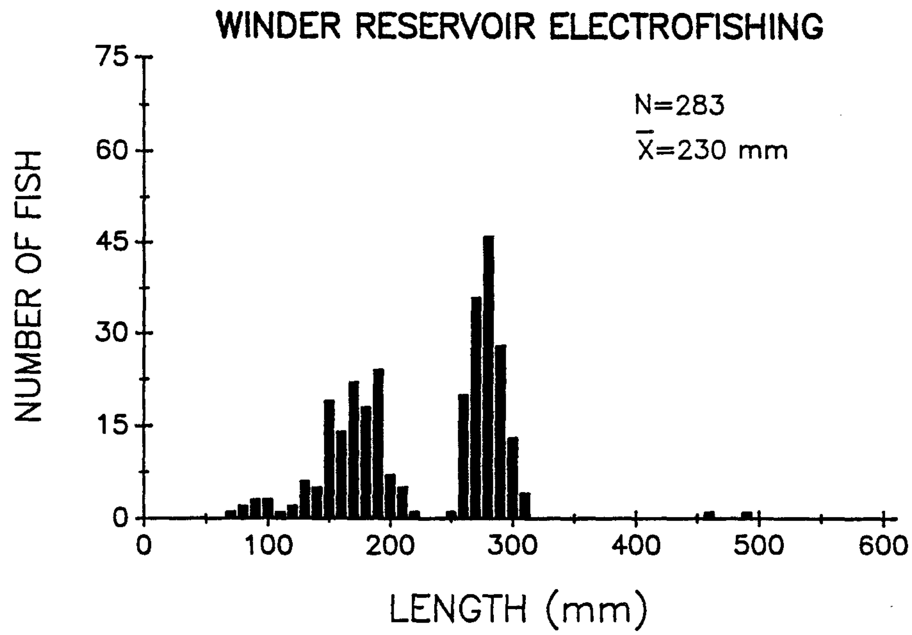


Figure 2. Length frequency distributions of largemouth bass sa
by electrofishing in Condie and Twin Lakes Reservoir
Franklin County, Idaho, May 1988.



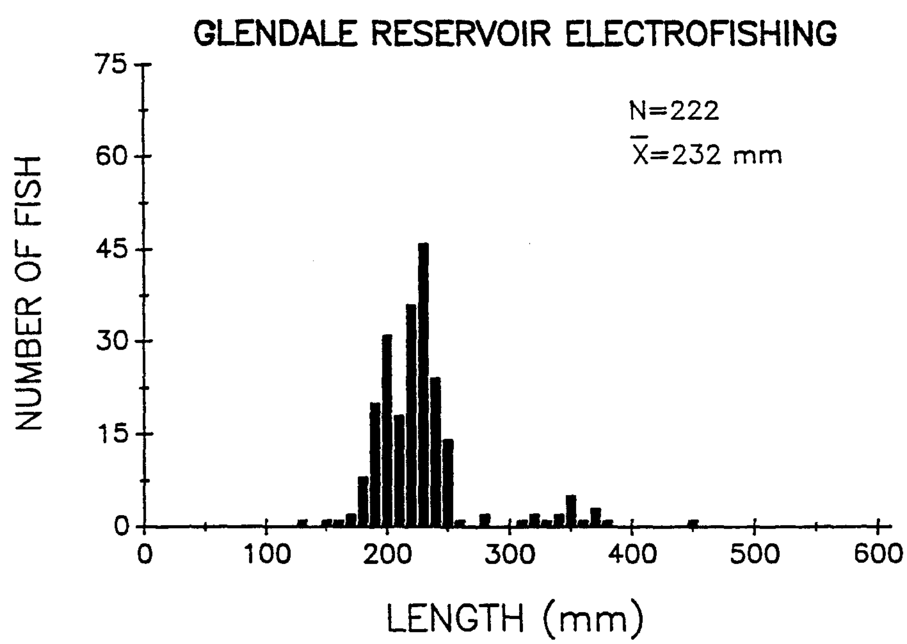


Figure 3. Length frequency distributions of largemouth bass samp by electrofishing in Winder and Glendale Reservoirs, Franklin County, Idaho, May 1988.

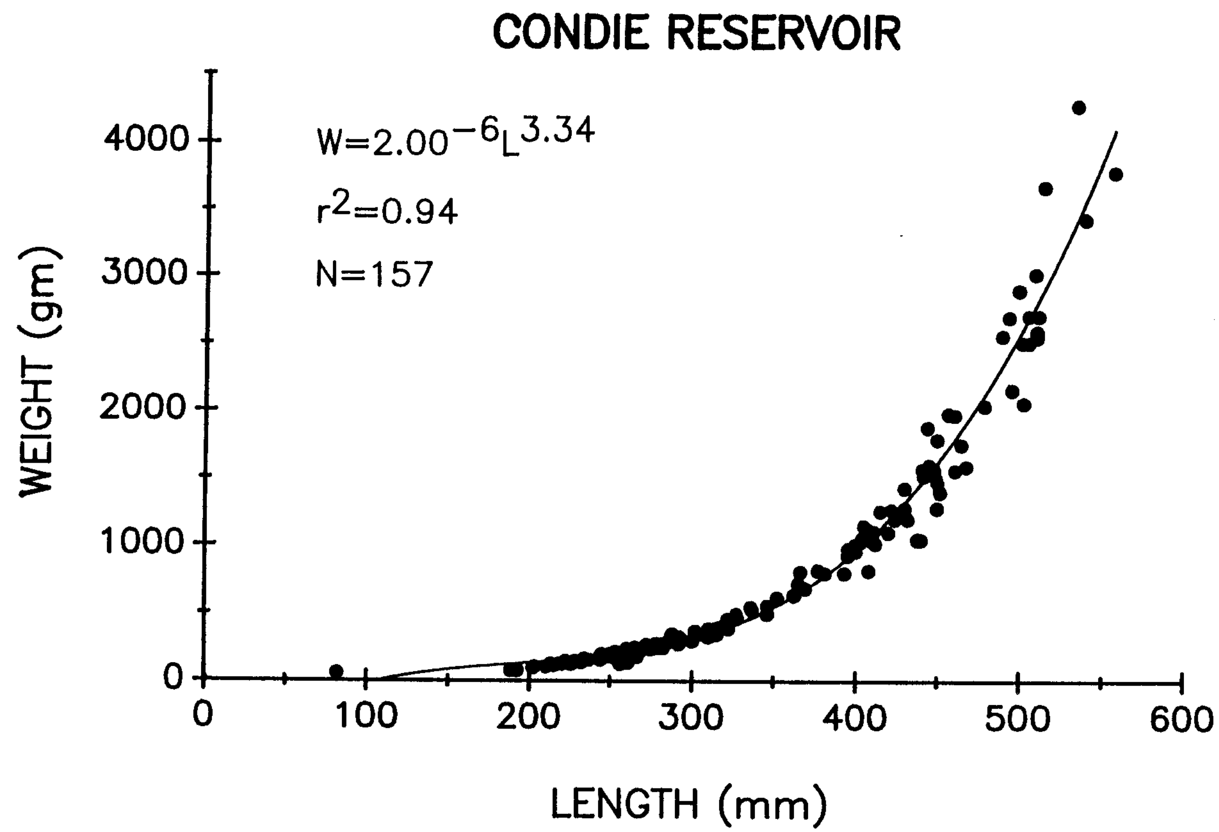


Figure 4. Length-weight relationship for largemouth bass in Condie Reservoir, Franklin County, Idaho, May 1988.

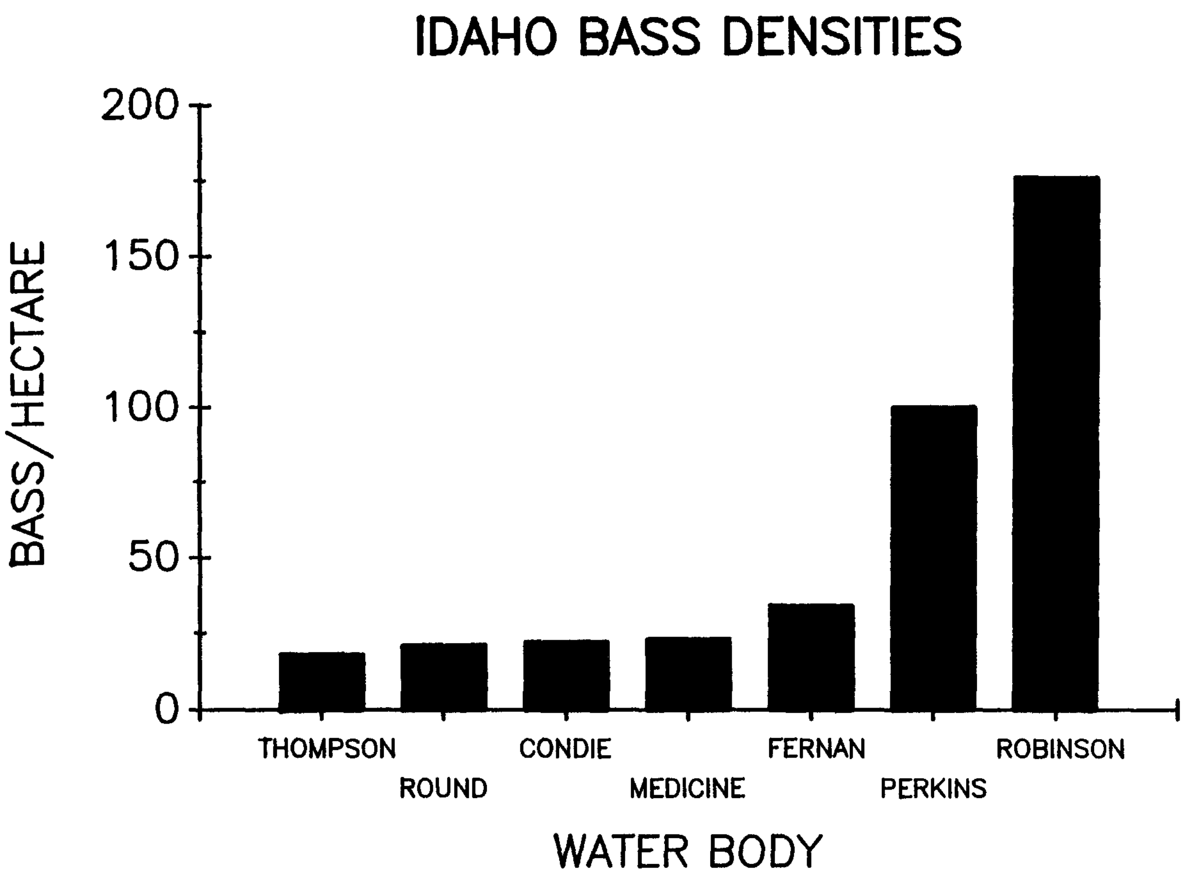


Figure 5. Estimated largemouth bass densities (Fish ≥ 150 mm/Hectare) in six northern Idaho waters (adapted from Reiman 1987) and Condie Reservoir, May 1988.

We used the population estimate, a length-frequency distribution and a calculated length-weight relationship (Figure 4) to estimate total biomass. Bass biomass (>150 mm) in Condie Reservoir was estimated at 504 kg, or 10.7 kg/hectare. Largemouth biomass in northern Idaho lakes ranged from 4 to 22 kg/hectare during the early eighties, prior to the 305 mm minimum size limit being imposed.

Age and Growth

Three of four reservoir populations sampled displayed a typical age distribution, with the majority of fish concentrated in younger size classes (Table 1). On Winder and Twin Lakes Reservoirs, the 1984 year-class (age-4) appeared strong relative to the 1985 year-class. However, the age distribution might well have been influenced by gear selectivity. On Condie Reservoir, bass appeared fully recruited to the gear by age-3, and we collected a wide range of age-classes up to age-14 (558 mm). Scale analysis was not conducted on Glendale bass because very few fish were collected and aging had been conducted on these limited size classes in 1986 (Heimer and Schill 1987).

Some variability in length-at-age estimates existed, but overall growth rates in the three reservoirs were similar (Figure 6). Actual numeric data are in Appendix A. Although we didn't conduct statistical analyses, growth in Winder Reservoir appears to lag behind both Condie and Twin Lakes in early age-classes and remains slower through later ages (5-7). Slow growth of Winder bass was also noted in 1986 (Heimer et al. 1987). Growth in northern Idaho lakes was similar to that in Winder for early age-classes, but length-at-age became nearly identical to Condie, Glendale, and Twin Lakes after age-4.

The reported length at age-1 for Condie and Twin Lakes (129 and 130 mm), respectively, is excellent growth for bass in temperature waters. However, these estimates are well above values reported from less extensive samples in these two waters (109 and 93 mm, respectively) during the previous two field seasons (Heimer et al. 1987, Schill and Heimer 1988). We recommend late fall seining of age-0 bass next year to assess lengths of known-age fish at time of first annulus formation. This data will enable us to validate placement of the first annulus amid what appear to be several growth checks. With the exception of the above discrepancy for age-1 fish, results of this year's scale analysis on Condie and Twin Lakes Reservoirs were nearly identical to values reported on Glendale and Lamont Reservoirs; nearby waters sampled during the past two field seasons.

Based on sampling during past years, growth rates of bass in Region 5, and on the state as a whole, appear to be typical for populations approaching the northern limit of the species range. Length-at-age estimates for Condie Reservoir were nearly identical to those reported for upper midwest states at similar latitudes (Figure 7). As expected, growth rates for Condie Reservoir were well below those reported for southeastern

Table 1. Estimated age composition (numbers) of largemouth bass collected by electrofishing in three Franklin County, Idaho reservoirs, May 1988.

Reservoir	N	Age 2	3	4	5	6	7	8	9	10	11	12	13	14
Winder	276	108	20	93	43	12								
Twin Lakes	429	17	61	171	89	52	19	14	5	1				
Condie	475	47	261	48	41	19	19	14	5	10	6	2	2	1

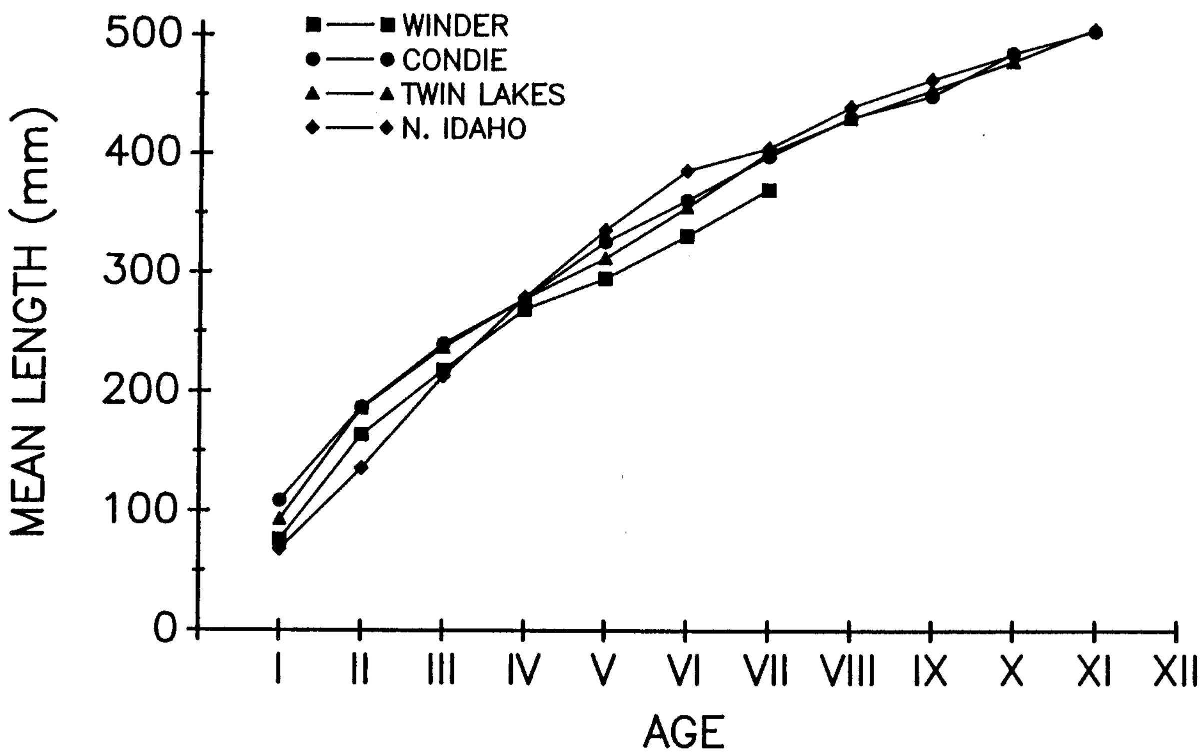


Figure 6. Mean back-calculated length-at-age for largemouth bass sampled from three Franklin County reservoirs in 1988, and an average from six northern Idaho lakes (Rieman 1987).

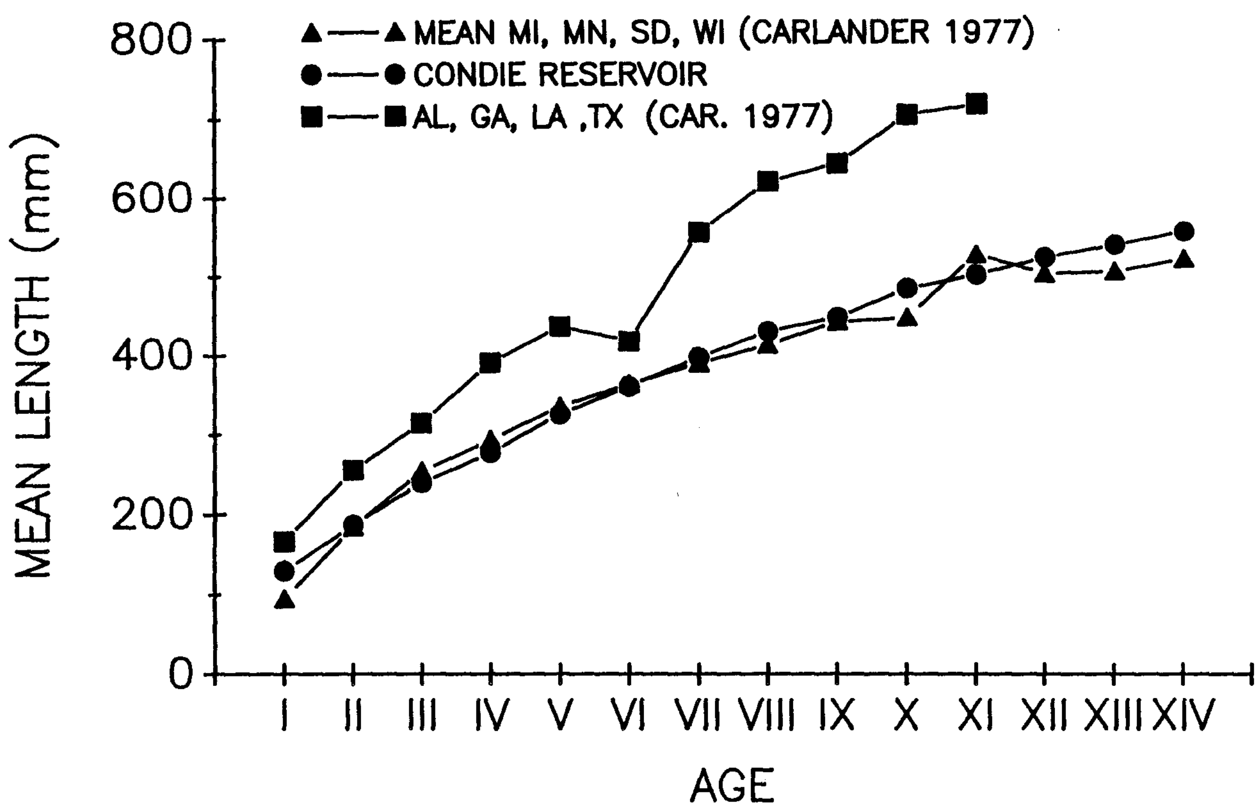


Figure 7. Mean back-calculated length-at-age for largemouth bass in Condie Reservoir, May 1988, and two other geographic regions of the USA.

U.S. waters with year-round growing seasons. While this observation comes as no surprise, it may explain the unrealistic expectations of Idaho bass anglers familiar with southern fisheries, either through personal experience or via popular television "fishing shows."

Angler Use

Total angler use on the four reservoirs appeared directly related to surface area. Twin Lakes Reservoir received by far the greatest total effort (24,541 hours), followed by Glendale, Condie, and Winder Reservoirs (Table 2). The 1988 estimates on Twin Lakes and Condie Reservoirs were very similar to those reported for the 1985 season at 29,506 and 7,613 angler hours, respectively (Heimer 1984).

On a unit-area basis, the two smaller reservoirs received higher effort levels (Figure 8). However, the overall range, 133 to 189 hours/hectare on Condie and Glendale, respectively, was minimal.

We anticipated greater divergence in use on the four reservoirs evaluated this year. If bass evaluations are continued in the near future, an attempt should be made to include waters suspected to receive effort levels well above and below this reported range.

As in most other regional fisheries, a large percentage of total effort occurred during the first two-week interval of the season (May 28 to June 10). This is particularly true of Twin Lakes Reservoir, where boat use on the opening weekend was heavy (Figure 9, Appendix B). Forty-two percent of Twin Lakes boat effort was expended during this time period. Boat use declined continuously on all reservoirs throughout the remainder of the season.

Overall, a similar effort pattern existed for shoreline anglers. Shore fishermen on Condie Reservoir were virtually absent by August 6 because of severe drawdowns and the lack of fishable water near the single access area. In contrast, shore use on easily accessible Glendale Reservoir increased during the fall drawdown period, particularly when fish were concentrated in a small 3-4 hectare pool. The increase in late season effort on Glendale may be an artifact of the drought year. Discussions with the local enforcement officer, however, point towards a rejuvenation of these fisheries during normal water years with the onset of more favorable water conditions (Tom Lucia, personal communication).

A review of the four fisheries by angler type yields expected results. Condie Reservoir was fished largely by boat anglers (75% of effort), presumably due to limited shoreline access (Appendix B). Boat fishermen also comprised the majority of anglers on Twin Lakes, while Glendale use was equally divided among the two user groups. Because of past county restriction of boats, 71% of Winder anglers fished from shore. However, a surprising 292 of total effort on Winder was expended by tube fisherman.

Table 2. Estimated angler hours expended on four Franklin County Reservoirs during two-week intervals between May 28 and September 16, 1988.

Interval	Interval starting date	Reservoirs Twin Lakes	Glendale	Condie	Winder
I	28 May	9,817	2,696	3,217	2,411
II	11 June	4,014	873	2,535	1,027
III	25 June	2,184	2,170	1,053	456
IV	9 July	2,758	1,733	819	966
V	23 July	1,458	1,305	530	534
VI	6 August	1,255	1,235	563	229
VII	20 August	1,656	1,145	148	579
VIII	3 September	1,399	1,209	0	410
Total		24,541	12,366	8,865	6,612
Surface Hectares		181	93	47	38
Effort/Hectare		136	133	189	174

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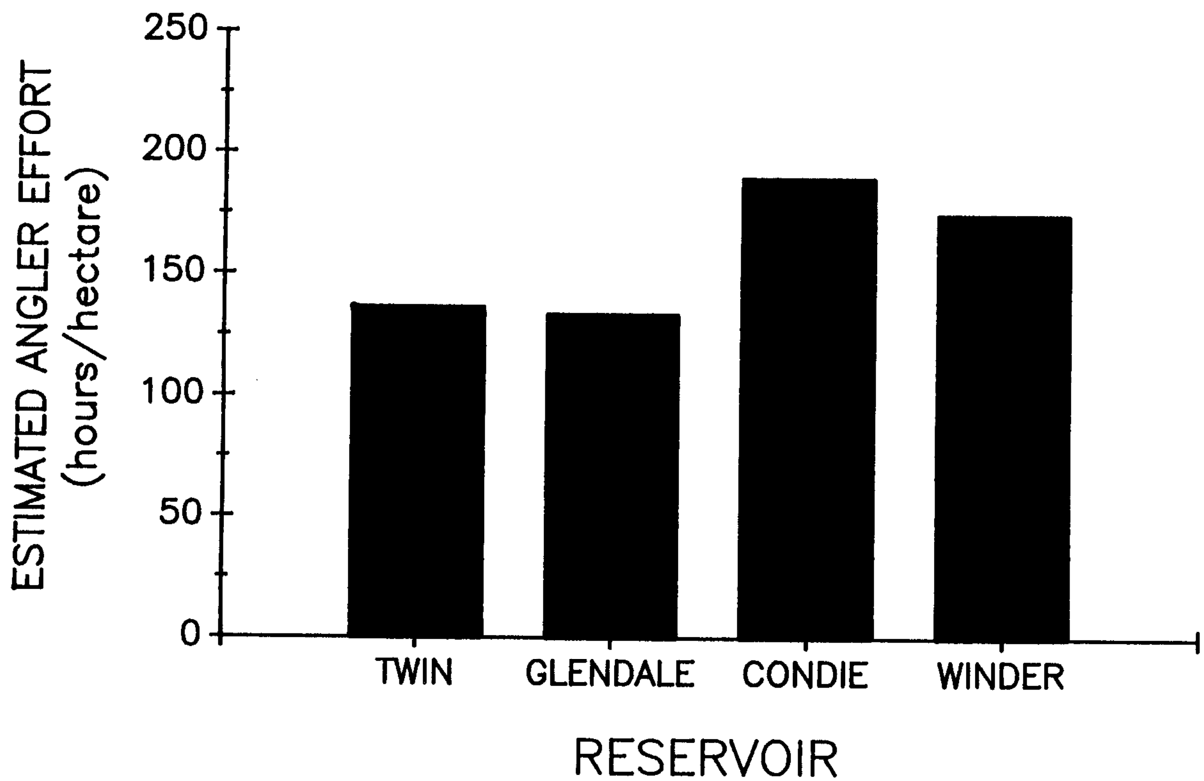

Figure 8. Estimated angler effort (hours/hectare) on four Franklin County, Idaho, Reservoirs 28 May-16 September.

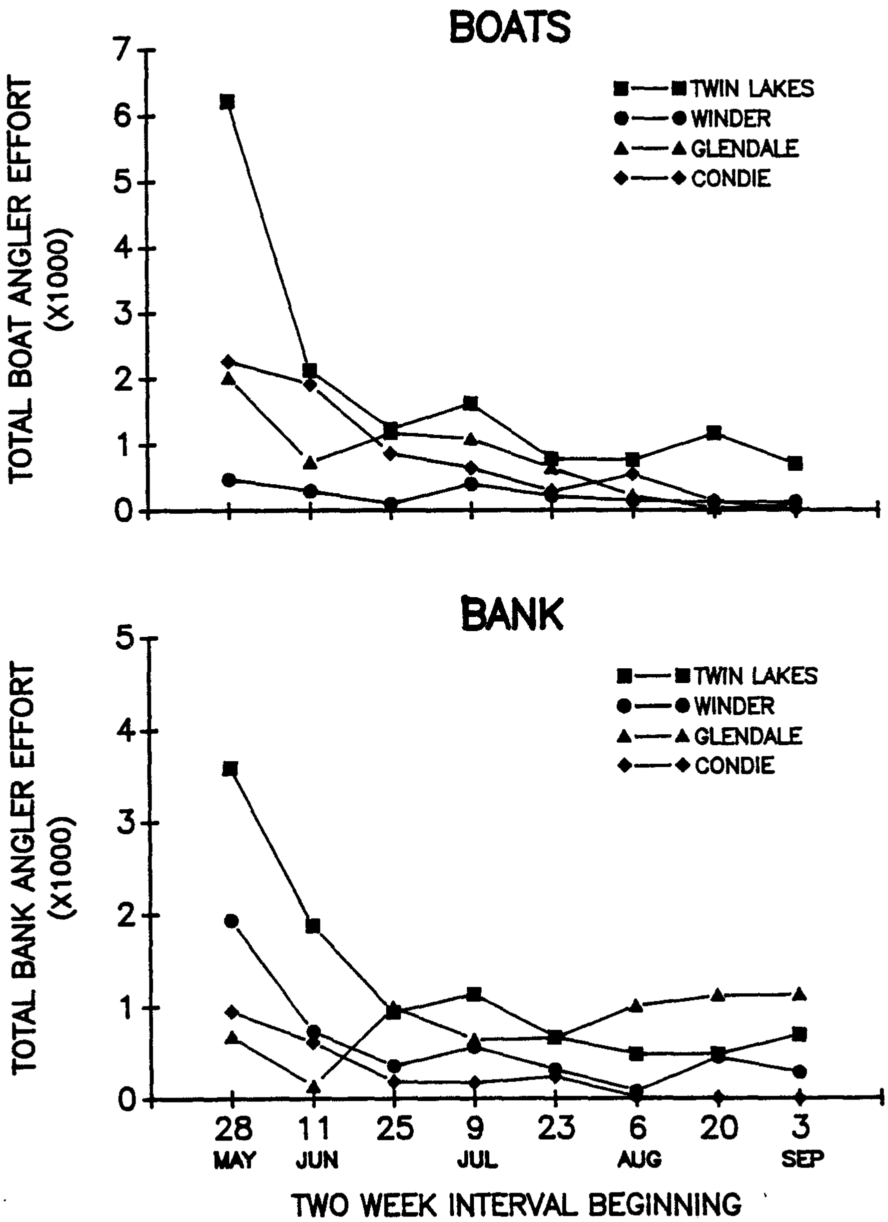

Figure 9. Estimated boat and bank angler effort during two week intervals on four Franklin County, Idaho, Reservoirs, 1988. Winder Reservoir boat data is actually for tubes only.

Catch

Largemouth bass harvest rates on Condie Reservoir were low at .05 fish/h during the first month of the season. Heimer (1984) reported a similar catch rate for largemouth bass during the same month-long period (.06). Boat fisherman harvested bass at nearly twice the rate of shore anglers, but still only harvested 0.06 fish/h during the one-month period (Table 3). Hatchery rainbow trout and bluegill provided much better catch rates of .37 and .24 fish/h, respectively.

Total number of bass harvested from Condie Reservoir during the initial month of the angling season was estimated at 276 fish. Eighty-six percent of these fish were caught by boat anglers. The opening-month harvest represented a 50% increase over 1985 estimates, when 183 largemouth bass were creeled by anglers during the same time period (Heimer 1984). Given the confidence limits of both estimates however, the significance of these results is unknown.

In 1985, the vast majority of bass harvested over the season (66%) occurred during this same time period. We assume a similar, or even further skewed, harvest pattern existed in 1988, particularly due to the extreme drawdown and lack of easy boat access in late July and August. An early season harvest regime is further substantiated by the seasonal distribution of tag returns discussed below.

Largemouth bass comprise a small component of total fish caught on Condie Reservoir (7%) during June. Hatchery rainbow trout were most numerous in the catch at 57%, followed by bluegill at 36%.

We examined 124 bass from angler creels in Condie Reservoir during the initial month of the season. These fish averaged 284 mm in total length, well below the statewide minimum size limit of 305 mm. Only 26% of the harvest exceeded the statewide standard, and the largest fish checked was 439 mm (Figure 10). Based on tag returns, however, larger fish are creeled by anglers.

Winder Reservoir was the only other water where we measured appreciable numbers of bass. The 28 bass averaged 288 mm and only 3 (11%) exceeded the statewide minimum size of 305 mm.

Exploitation

Estimates of exploitation based on reward returns ranged from 28% on Twin Lakes to 56% on Glendale Reservoir (Table 4). The nominal sample size of reward-tagged fish on Glendale (n [a] 9), however, renders this data very unreliable. We were simply unable to capture enough 300+ mm fish in Glendale to provide meaningful results.

A comparison of estimated exploitation using reward and non-reward tags (assuming a 50% non-compliance rate) yielded similar results. In

Table 3. Catch rates and estimated harvest of largemouth bass and additional species during two 14-day intervals in Condie Reservoir, Franklin County, Idaho, 1988[1].

Interval	Interview hours	HRB Fish/h	HRB Est. harvest	LMB Fish/h	LMB Est. harvest	BG Fish/h	BG Est. harvest	Total Fish/h	Total Est. harvest
BANK									
28 May-10 June	395	.35	331	.03	28	.30	284	.68	643
11 June-24 June	288	.18	110	.02	12	.09	55	.29	178
BOAT									
28 May-10 June	967	.50	1,135	.07	159	.26	590	.83	1,883
11 June-24 June	638	.29	557	.04	77	.22	423	.55	1,057
Total (Bank & Boat)		.37	2,133	.05	276	.24	1,352	.66	3,763

[1]HRB = Hatchery Rainbow Trout
LMB = Largemouth Bass
BG = Bluegill

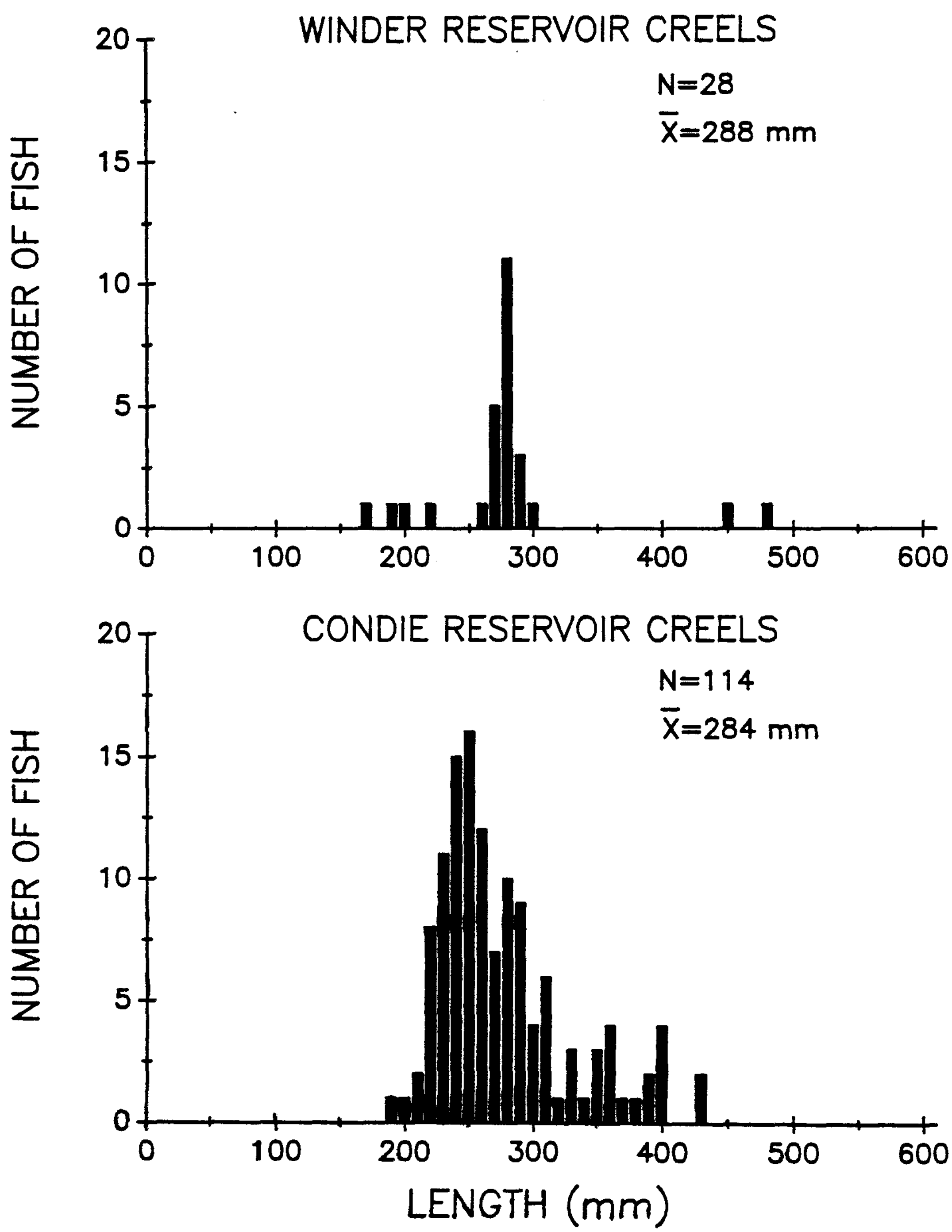

Figure 10. Length frequency of largemouth bass from angler creels in Condie and Winder Reservoirs, Franklin County, Idaho, May-June 1988.

Table 4. Estimated annual exploitation of largemouth bass in four Franklin County Reservoirs from both reward and non-reward floy tags, 1988.

	Reward		Non-Reward[1]	
Reservoir	Exploit (%)	N	Exploit (%)	N
Twin Lakes	28	50	24	50
Condie	33	96	36	115
Winder	44	28	51	119
Glendale	56	9	29	7

[1]Assuming 50Z non-compliance.

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fact, reward vs non-reward estimates on Twin Lakes and Condie Reservoirs were nearly identical (Table 4). The Winder estimate was based solely on non-reward tags (51X) however, and was substantially higher than the reward tag estimate (442). Given the larger sample size of non-reward tags in Winder, the estimate may indeed be more accurate.

Further credence is given to an assumed 50% non-compliance rate when pooling results from all four reservoirs. We believe this was justifiable since the four reservoirs in question have similar angler clientele, including a high percentage of non-residents and Pocatello anglers. We floy-tagged 474 bass in 1988 using 183 reward and 291 non-reward tags. Overall non-compliance for all four reservoirs combined was exactly 50%. Given these results, future exploitation studies in nearby regional waters could probably be limited to non-reward tags.

Because of the limited number of larger fish sampled from angler creels in Condie Reservoir during the first month of the season, we were curious about exploitation rates of larger fish. Since bass fishing has only recently been popular for many Region 5 anglers, we hypothesized that anglers were unable to catch large bass we had observed during electrofishing operations. This has been reported for other bass fisheries, including Table Rock Lake, Missouri (Novinger 1984). Despite obvious sample-size limitations, exploitation appeared to remain constant on both Condie and Twin Lakes Reservoirs for increasing 100 mm size groups (Table 5). Overall, the range of reward tag exploitation estimates reported for the three reservoirs with usable data (28 to 44%) is lower than might be expected considering the level of angler effort observed and the lack of good cover during much of the fishing season. Our estimated exploitation rate per unit of angler effort was, in fact, well below that reported for northern Idaho (Figure 11).

Northern Idaho anglers, in bodies of water receiving low levels of effort (<200 hours/hectare), consisted largely of "serious" bass fishermen who routinely participate in tournaments (Bruce Rieman, personal communication). Although several tournaments are held annually on Twin Lakes and Glendale Reservoirs, much of the effort expended on our study waters was directed at salmonids or anything that swims (Table 6). Consequently, bass exploitation per given effort level was lower in our study reservoir than in northern Idaho.

The ability of a fish stock to support a given level of exploitation is, to a large degree, dependent on growth and natural mortality (Ricker 1975). In northern Idaho bass populations, exploitation rates of 20 to 30% have been suggested as adequate for optional stock maintenance, while rates above 40% are almost certainly indicators of over-harvest (Rieman 1987).

Since bass in Winder Reservoir appear to grow more slowly than bass in other regional waters, and exploitation was estimated at 44%, an effort should be made to include this reservoir under the statewide regulation during the next biennial cycle. This is especially true when considering the small size of bass harvested under the current regulation (Figure 10).

Table 5. Size specific exploitation of largemouth bass in Condie and Twin Lakes Reservoirs based on reward floy tags, Franklin County, Idaho, 1988.

	Reservoirs			
	Condie		Twin Lakes	
Length Range	Exploit (%)	(N)	Exploit (%)	(N)
200-299	37	(46)	[1]	
300-399	25	(24)	33	(18)
400-499	33	(24)	28	(29)
500-599	50	(2)	0	(3)

[1]Minimum size - 305 mm.

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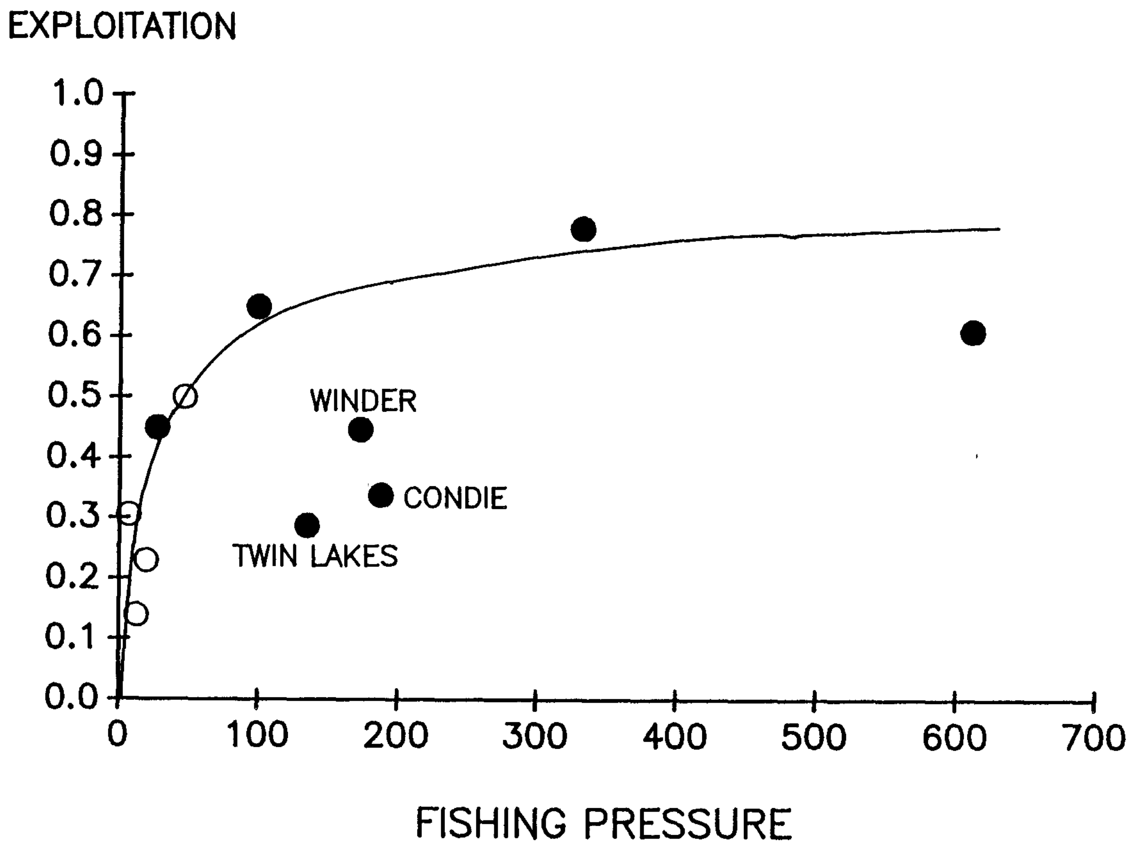

Figure 11. Relationship between estimated exploitation of largemouth bass and fishing pressure in Idaho waters. Unlabeled points represent data from eight northern Idaho lakes (from Reiman 1987).

Table 6. Primary fish of interest as reported by anglers on four southeastern Idaho Reservoirs, Franklin County, Idaho, 1988[1].

	Anglers Seeking					
	Salmonids		Centrarchids		Both	
Reservoir	%	N		N	%	N
Winder	45	37	38	32	17	14
Condie	31	202	44	285	25	160
Glendale	46	121	21	55	33	86
Twin Lakes	52	317	25	151	23	139

[1]The majority of interviews on Winder, Twin Lakes, and Glendale occurred during the first two weeks of the angling season.

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Additional information should be collected on Glendale Reservoir to accurately establish exploitation rates under the existing 305 mm minimum size regulation and to determine if additional length restrictions are necessary. Severe drawdown regimes during the past three to four years and a proposed continuation of this policy in the future by the Preston-Whitney Irrigation Company, however, may prevent improvement of the bass population via reductions in exploitation.

Condie Reservoir Mortality and Regulation Modeling

Overall, results of the exploitation studies appear closely related to stock structure on the four reservoirs (Table 7). Since a dynamic pool model had already been constructed to examine this relationship for northern Idaho bass populations with similar growth to rates to ours (Rieman 1987), we began by plotting our data on the existing simulations to obtain a cursory impression of potential population enhancement via regulation.

Our data appeared to fit the model quite well, and interestingly, all four data points were grouped near the M = .20 natural mortality simulation (Figure 12). This value is often used in bass literature when accurate estimates of M are unknown (Rieman, personal communication). Assuming the model projections apply, all four populations could benefit from more restrictive regulations in terms of stock structure.

Suggestions for improvement of the Winder and Glendale bass fisheries are discussed above. Despite relatively low exploitation estimates, PSD's in Twin Lakes and Condie Reservoirs could theoretically be nearly doubled with either low or modest levels of natural mortality and adequate forage. Because of its smaller size and proven ability to support very large bass, we selected Condie Reservoir as a water to simulate restrictive regulations.

We constructed a catch curve for Condie Reservoir bass using spring electrofishing data and estimated total mortality using linear regression. Unfortunately, our estimates of total instanteneous mortality (Z) for all fish in excess of age-4 and fishing mortality (F) as determined from tagging data essentially allowed for no natural mortality in the population (Figure 13).

The incorrect interpretation of catch curves often results in imprecise estimates of Z, and ultimately, natural mortality (M) in many modeling analyses (Vetter 1988). In the case of Condie Reservoir, we considered our estimate of exploitation to be more robust than our ability to non-selectively sample, construct, and interpret the catch curve. Accordingly, a re-examination of the catch curve yielded an alternate interpretation, that of increasing mortality in younger-aged bass (Figure 14). Such a concave appearance in catch curves are common (Ricker 1975) and have been observed in northern Idaho bass populations, presumably due to increasing warmwater interest and harvest in recent years (Rieman 1983).

Table 7. Estimated exploitation and proportional stock density of largemouth bass populations in Franklin County, Idaho, reservoirs, 1988[1].

Reservoir	Exploitation	PSD
Condie	33	.31
Twin Lakes	28	.25
Winder	44	.12
Glendale	56	.09

[1]Exploitation from reward floy tags PSD from spring electrofishing.

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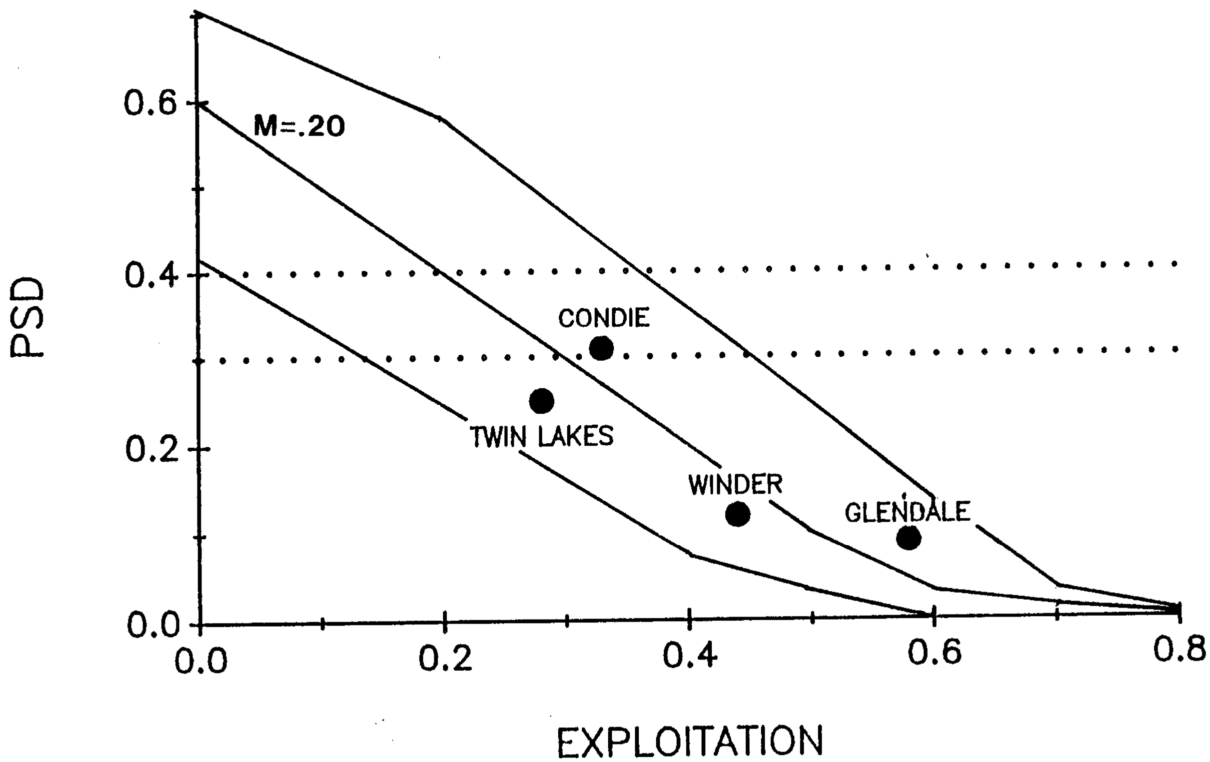

Figure 12. Proportional Stock Density index (PSD) of largemouth populations projected using a dynamic pool model at varying levels of exploitation and natural mortality (from Rieman 1987). Labeled points represent observed data from four Franklin County reservoirs, 1988. Dotted lines reference typical management goal for largemouth bass fisheries yield.

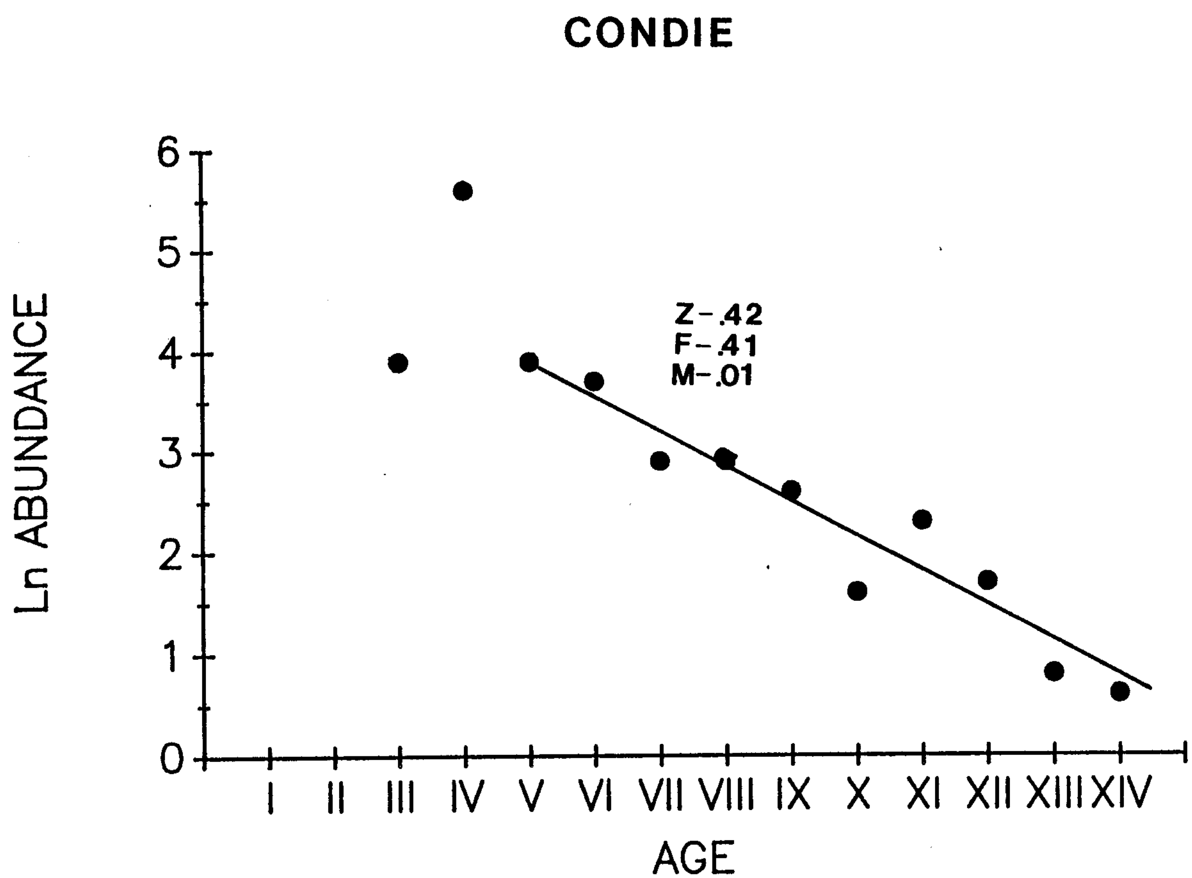

Figure 13. Catch curve for largemouth bass sampled by electrofishing on Condie Reservoir, May 1988.

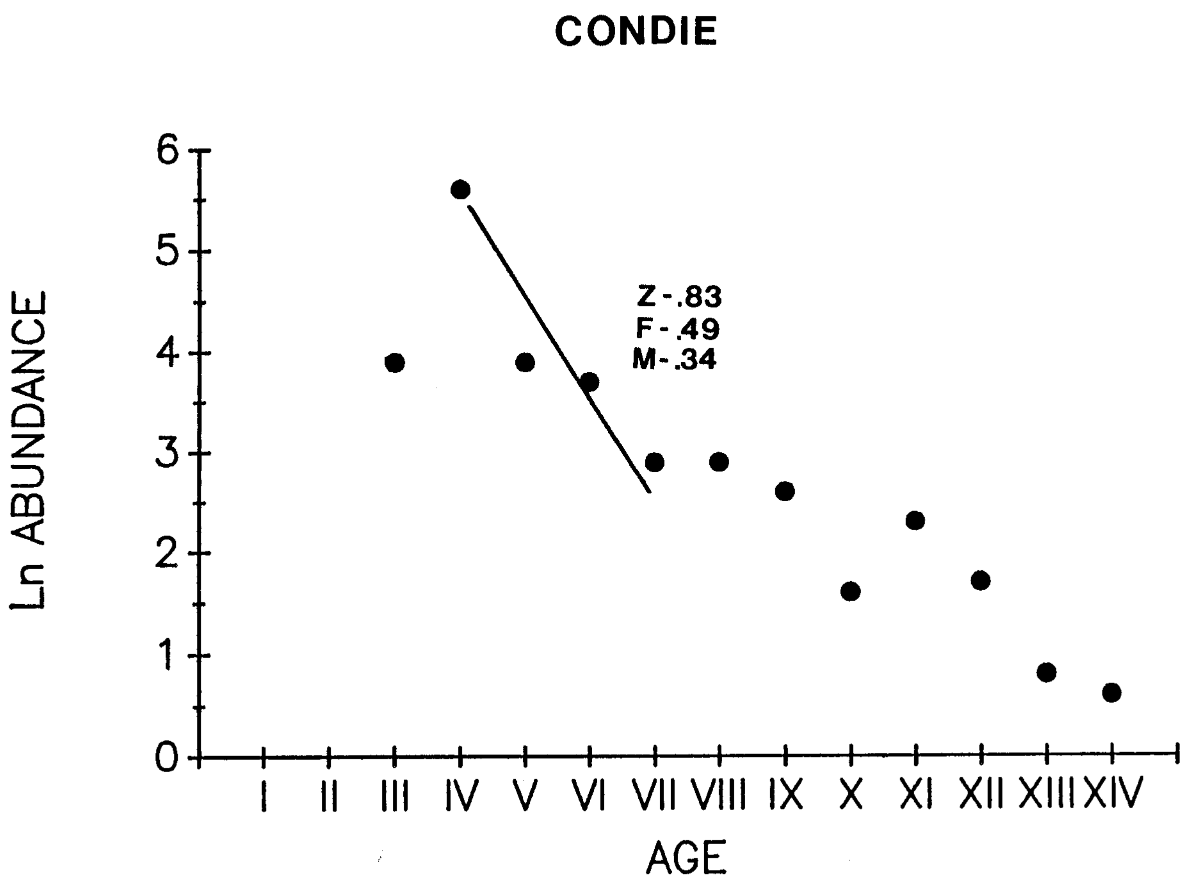

Figure 14. Alternate catch curve and mortality estimates for largemouth bass sampled by electrofishing on Condie Reservoir, May 1988.

We use the latter catch curve interpretation, considering the assumption of stable recruitment, and simulated the response of the Condie Reservoir bass population to several regulation options (Figure 15). Utilizing our interpretation of increasing mortality on younger-aged bass, the model predicts that under current regulations future age-classes would be limited to 10, rather than the existing 14. Implementation of the statewide minimum would result in increased numbers of age-5 to age-8 bass, but availability of large bass would be similar to that provided by the present regulation. The implementation of a 16-inch minimum size or catch-and-release regulations would result in a substantial increase in numbers of larger (400+ mm) bass.

Car Counter Evaluation

Our check station results indicate that car counters may be an alternative to season-long angler counts, particularly if estimates of angler use alone are needed. Results of the regression analyses yielded a highly statistically significant relationship ($r = .90$, $P <:005$) between the number of axle counts and known angler effort (hours) for eight days on Condie Reservoir (Figure 16). Calculation of the actual regression line and associated confidence limits would enable us to predict angler effort based solely on axle counts in the future. Unfortunately, because of manpower constraints we were unable to continue operation of the car counter during the random angler counts conducted on Condie Reservoir for the remainder of the angling season. A full comparative census would ultimately prove invaluable in evaluating the two census techniques.

Despite the strong relationship presented in Figure 16, several factors may limit use of car counters in future effort estimates. First, the methods we used may only be applicable to waters with single or extremely limited access roads. In addition, reservoirs receiving variable amounts of non-angler use may prove unsuitable for the development of 'a statistically significant relationship. In particular, the impact of variable non-angler traffic could have a proportionally greater affect on estimates during low angler-use periods. Condie Reservoir, and a number of additional Region 5 reservoirs, however, appear especially suited to this type of census technique. In situations where harvest estimates are also needed, angler interviews will still have to be conducted. Once the initial regression line is constructed, angler interviews will still have to be conducted, however, interviews will only have to be done on weekends when a larger number of fishermen can be approached. In addition, after a regression line is constructed and a statistical relationship established, car counters could be utilized to monitor changes in angler use on a year-to-year basis, assuming no major changes in clientele occurred. Managers on the Bighorn River in central Wyoming have used a somewhat similar approach to estimate changes in angler use over a 10-year period. Resultant data, collected with minimal manpower expenses, were used in developing a management plan for the fishery (Jim Darling, Montana Department of Fish, Wildlife and Parks, personal communication).

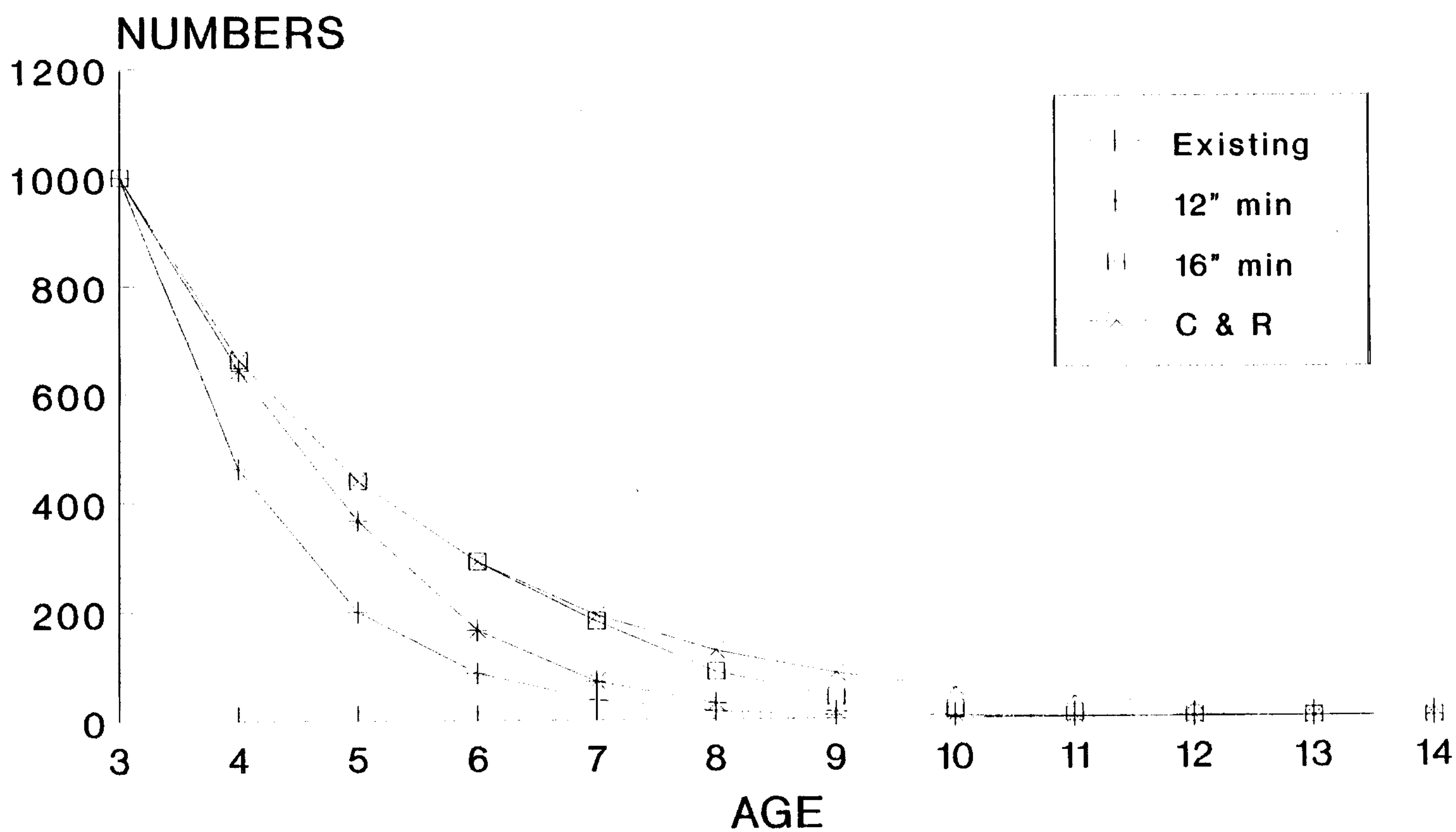

Figure 15. Projected largemouth bass populations in Condie Reservoir after one generation under four different harvest regimes.

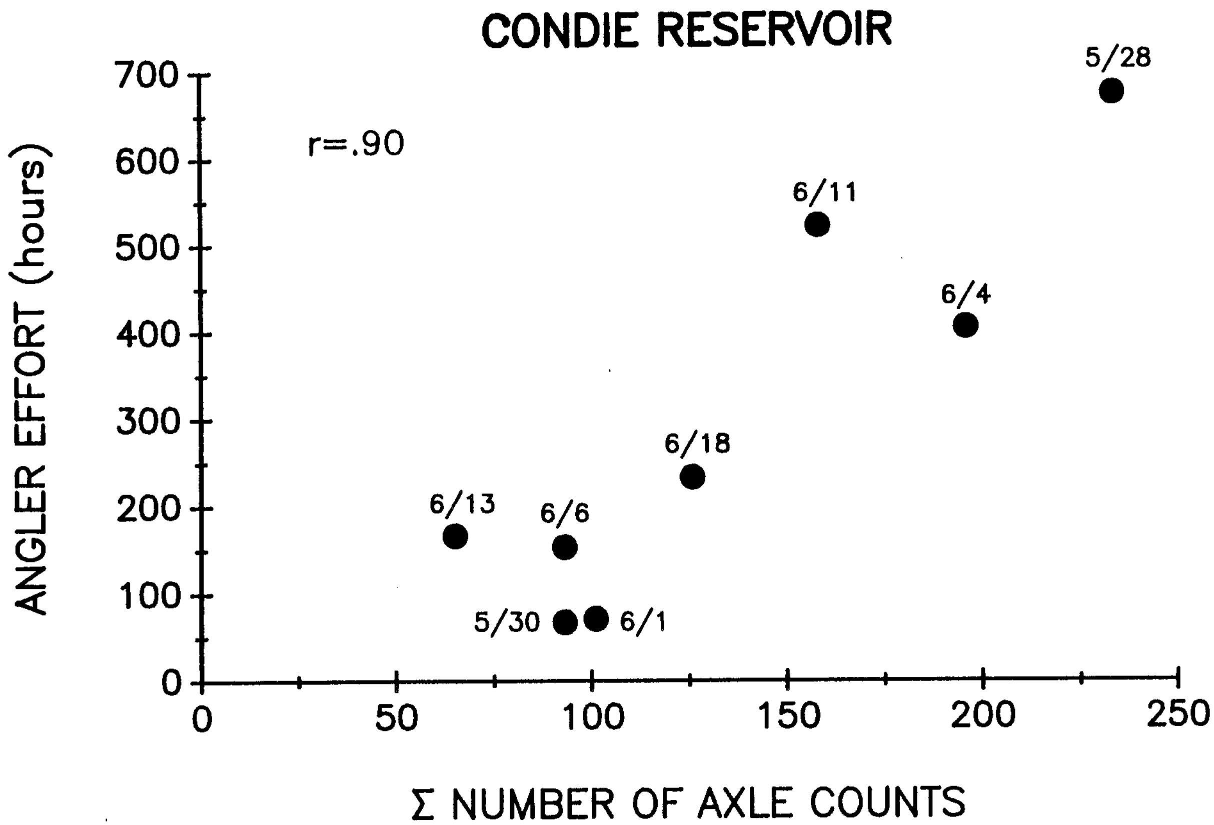

Figure 16. Relationship between known angler effort and the number of axle counted on the sole access road for Condie Reservoir, Franklin County, Idaho 1988.

Finally, use of newer counting equipment, capable of completing and storing daily or even hourly counts for up to two weeks, may result in substantially more accurate effort estimates than are currently available via typical random angler counts. The ability to estimate angler use with confidence limits for every day of the week seems substantially more palatable than the standard approach of assuming the lone weekend and weekday count days as representative of the entire week.

In summary, the car counter approach in estimating angler effort seems to hold promise, at least for certain Idaho waters. We recommend that additional efforts be made to validate this technique and evaluate its comparability to standard creel census techniques.

Catchable Rainbow Trout Evaluation

Overall, return-to-the-creel estimates based solely on reward tags (n = 100) were low on all four reservoirs. These values ranged from 9% on both Twin Lakes and Winder Reservoirs to a high of 26% on Glendale Reservoir (Table 8).

There was no apparent relationship between season-long angler effort and return-to-the-creel estimates. Winder Reservoir received one of the highest levels of angler use (174 hours/hectare) and provided the poorest returns. Glendale Reservoir received the lowest unit use and exhibited the best return rates.

Return estimates using reward and non-reward tags (assuming 50% non-compliance) were actually quite similar. However, estimated returns from non-reward tags were slightly higher in three of the four reservoirs (Table 8).

Non-compliance ranged from 33% on Condie Reservoir to a high of 70% on Winder Reservoir. Reason for the disparity in compliance is unknown and may reflect sampling error.

Considering the popularity of the fisheries concerned, return-to-the-creel estimates were lower than expected. The drought and resultant low pools in August and September may have negatively affected returns by restricting or eliminating boat access on Condie, Glendale, and Twin Lakes Reservoirs. Mortality from thermal stress may have also been a factor.

In addition, substantial numbers of catchables overwinter in Condie and Twin Lakes Reservoirs (Heimer 1984, Tom Lucia IDFG, personal communication) and are caught the next season. We intend to continue soliciting angler returns for the 1989 season to assess second year returns. Given the low first-year returns, however, especially on Twin Lakes and Winder Reservoirs, final return-to-the-creel of 1988 plants will probably remain low.

Table 8. First year return-to-the-creel estimates for hatchery rainbow trout planted in four southeastern Idaho Reservoirs, Franklin County, Idaho, 1988[1].

Reservoir	Return-to-Creel			Non-Compliance
	Rewards		Non-Reward[2]	
	%	95% CL	%	
Condie	19	+ 11-27	25	33
Twin Lakes	9	+ 3-15	11	41
Winder	9	+ 3-15	5	70
Glendale	26	+ 17-35	33	36

'Season dates May 28-November 30
[2]Assumes 50Z non-compliance

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DISCUSSION

Largemouth Bass

Results of the study indicate the need for more restrictive bass regulations in the region, particularly on waters with no minimum size limit. We did not estimate mortality on Winder Reservoir, but electrofishing results, excessive exploitation, and apparent slow growth all point to the need for the statewide minimum size restriction. Evaluation of this change should be conducted in five years to assess early effects on stock structure. If exploitation and mortality remain high on 305+ mm fish, consideration could be given to additional management options depending on public desires.

Based on our modeling results, the implementation of restrictive regulations on Condie would dramatically increase numbers of age-4 and older bass in the reservoir, and may, in fact, be necessary to offset declines in the present population due to increased fishing mortality. Given problems in catch curve interpretation and the assumptions underlying the entire modeling analysis, however, it is important to think of model predictions in relative terms.

Errors in estimation of natural mortality (M), for example, have been shown to radically alter yield in regulation simulation of bass populations. Low (incorrect) estimates of M, in particular, may lead to overly optimistic model projections (Rieman 1987). Determination of M in our simulation was ultimately dependent on the accuracy of both total and fishing mortality (Z - F + M).

Our estimate of F is probably low due to assumptions commonly included in floy tagging studies (ie. no tag loss and 1002 return of reward tags). The latter assumption is particularly suspect in our case since a high percentage (25%) of anglers fishing Franklin County Reservoirs are non-residents (Heimer 1985) and are largely unreachable by media coverage. A more realistic but unscientific-sounding approach would probably be to add 5 to 10% to exploitation estimates for all four reservoirs studied.

In the case of Condie Reservoir, under-estimation of F leads to a conservative estimate of M, an optimal situation when considering the role of natural mortality in population recovery following reduction in exploitation (Figure 12).

Simulation provides our best indication of population response to regulation change, even considering potential errors. We recommend the implementation of at least a 406 mm minimum size limit on Condie Reservoir to provide a trophy bass fishery in Region 5. Results of a questionnaire handout at Region-wide meetings held in May 1989 indicate strong support for such a fishery (Figure 17).

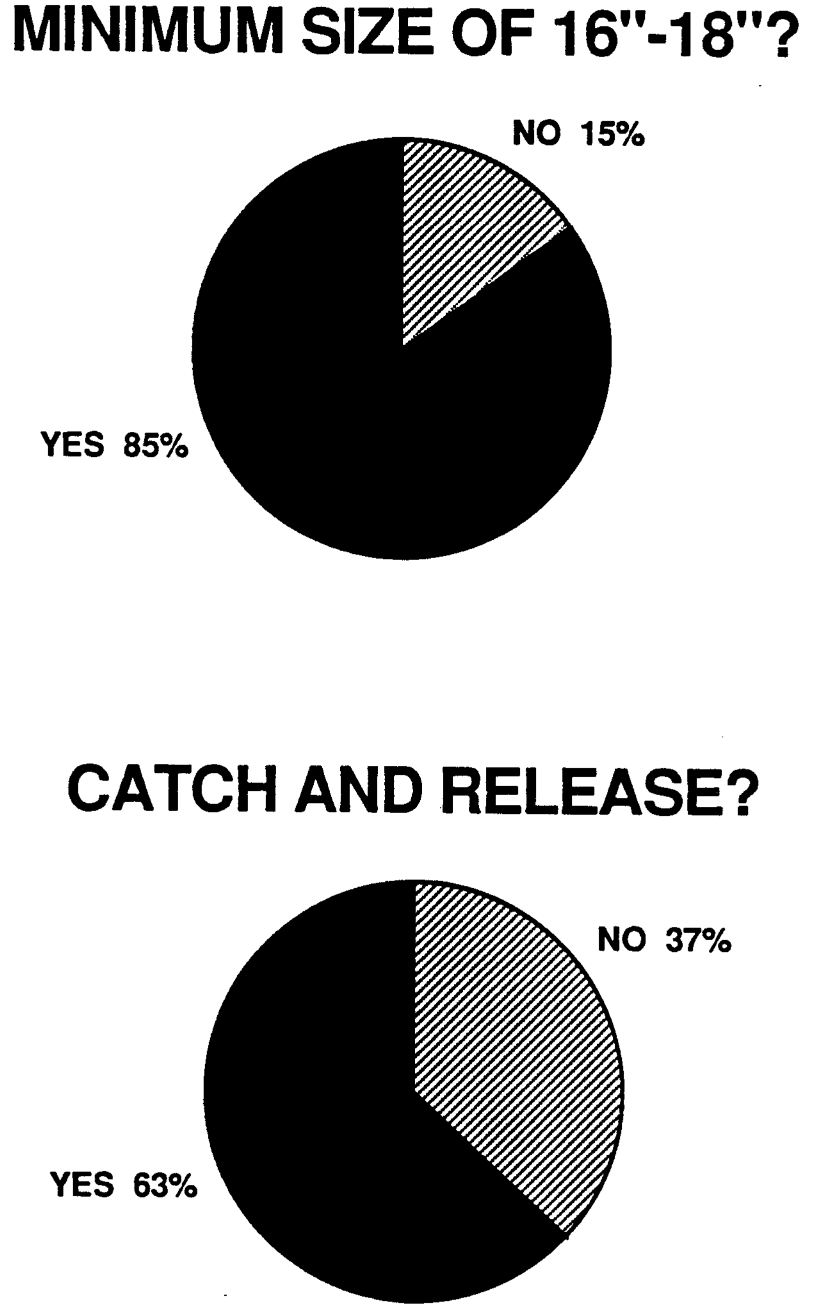

Figure 17. Percent of public meeting attendees in favor of special regulations for 1-2 regional bass fisheries, May 1989.

Public meetings also generated questions regarding a July 1 opener or catch-and-release fishing on Condie Reservoir to protect prespawning bass. Protection of all age-classes to ensure adequate recruitment is usually not considered necessary for bass populations (Al Van Vooren, IDFG personal communication). In addition, a delayed harvest opener would effectively eliminate harvest of trophy fish during the only period when bass are currently available in Region 5 bass fisheries (Table 9). For these reasons, we recommend that spring bass fishing be maintained on potential trophy waters.

Along with improvements in bass stock structure, trophy regulations will hopefully provide higher quality bluegill fishing. Although no scale analyses have been conducted, the Condie bluegill fishery currently contains few individuals in excess of 140 mm, and stunting is a suspected problem (Heimer et al. 1987). In Nebraska, a 380 mm bass will eat twice the weight of panfish that a 305 mm bass will consume. In fact, the primary goal of minimum size limits in that state, particularly the 305 mm minimum, is to provide better quality panfish populations (Winter 1989).

Catchable Evaluation

Because of the unknown effects of the drought, applicability of the 1988 data. for adjusting fish plants seems dubious. Since results from reward and non-reward tags were relatively similar, we recommend an additional years' data be collected prior to major shifts in hatchery stocking. Use of non-reward tags will provide additional data with minimal expense limited to processing time of returned tags.

Because of the limited number of tags used in this year's work, however, caution should be used in comparing our results with future return rates. Although we calculated confidence limits, a far greater sample size would be necessary to statistically compare returns from multiple years.

A similar situation exists if statistically accurate comparisons between reservoirs are sought for **a** given year. Substantially larger sample sizes would be needed to determine if a significant difference in returns between reservoirs occurred this season.

Table 9. Percent of total floy tagged largemouth bass reported caught during bi-weekly intervals on Condie and Twin Lakes Reservoirs, Franklin County, Idaho, 1988.

	Reservoirs			
	Twin Lakes		Condie	
Interval Dates	%	N	%	N
May 28-10 June	55.0	12	47.1	32
June 11-24 June	20	4	27.9	19
June 25-8 July	5	1	1.5	1
July 9-22 July	5	1	2.9	2
July 23-5 August	10	2	7.4	5
August 6-19 August			10.3	7
August 20-2 September			2.9	2
Totals	100	20	100%	**68**

JOB PERFORMANCE REPORT

State of: **Idaho**

Name: **REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS**

Project No.: **F-71-R-13**

Job No.: **5-c**

Title: **Upper Blackfoot System Fishery Management Plan (Public Document)**

Period Covered: **July 1, 1987 to June 30, 1988**

ABSTRACT

The Blackfoot River of central Caribou County, Idaho, supported legendary cutthroat fishing from the time of its settlement through the 1940s. Impacts from a series of management efforts in the 1960s, in conjunction with rapidly increasing fishing pressure, resulted in a dramatic decline in the fishery from 1958 to 1988.

The fisheries on Blackfoot Reservoir, and especially on the river, are badly in need of a renewed and focused restoration effort that only a long-term management plan can provide.

This public document is condensed from, and contains the salient points of, the technical version. Three goals and associated activities are identified in the plan. The first goal of restoring the river fishery on native cutthroat trout is primary and constrains the other goals and will drive the future management of the system.

Author:

Larry La Bolle
Regional Fishery Manager

INTRODUCTION

The Blackfoot River of central Caribou County, Idaho, supported legendary cutthroat fishing from the time of its settlement through the 1940s. Although angler effort increased markedly in the period 1951-57, the quality of fishing remained outstanding. Records of the Caribou County Sun listed numerous, verified catches of 5- to 8-pound native cutthroat during this period. Even as late as 1960, 20% of the cutthroat harvest exceeded 20 inches in length.

Impacts from a series of management efforts in the 1960s, in conjunction with rapidly increasing pressure, resulted in a dramatic decline in the fishery from 1958-78. Continued pressure had reduced the fishery to its current "collapsed" condition by the mid-1980s.

The reservoir, and especially the river fishery, are badly in need of a renewed and focused restoration effort that only a long-term management plan can provide. This draft plan outlines a goal for restoration of the wild cutthroat population, consistent with Department policy, and addresses two additional goals for increased harvest opportunity on the river and reservoir. Listed with each goal is an array of strategies designed to meet that goal. The final plan will include summaries of all public comment, and some aspects will likely change as a result of Commission and public review. A technical document describing the process and rationale of developing strategies and their subsequent monitoring programs will be companion to this draft.

SUMMARY OF GOALS AND OBJECTIVES

Goal: Restore the river fishery on native Yellowstone cutthroat trout to catch rates and age and size composition similar to those prior to 1960 (0.7 fish/h, with 20Z of the catch over 20 inches in length).

Strategies:
1. Develop suitable regulations.
2. Explore hatchery enhancement.
3. Improve habitat condition.

Goal: Provide more harvest opportunity in the lower Blackfoot River above the reservoir (trout harvest rate of 0.5 fish/h), consistent with public demand and the goal of wild cutthroat restoration.

Strategies:
1. Assess demand for harvest opportunity.
2. Implement stocking program.
3. Develop angler access.

Goal: Provide additional harvest opportunity on Blackfoot Reservoir on Bear Lake cutthroat and rainbow trout (at 0.7 fish/h during June and July, with 0.4 fish/h over the season) through improvement of release strategies and stocking rates. Also evaluate the potential to provide a fishery during the mid-summer, diversify opportunity, and improve overall catch rates for shoreline anglers.

Strategies:

1. Improve harvest rates and the opportunity to support more pressure on hatchery rainbow trout.
2. Increase harvest and provide better egg production on Bear Lake cutthroat trout.
3. Assess the potential benefits/impacts of smallmouth bass introduction.

DESCRIPTION OF THE DRAINAGE

The Blackfoot River drainage lies in central Caribou County, Idaho, with a watershed encompassing 350 square miles. The river flows approximately 22 miles from its origin at the confluence of Lanes and Diamond Creeks to the reservoir. Principal tributaries include Bacon, Diamond, Lanes, Sheep, Spring, and Timothy Creeks (Figure 1). The climate is semi-arid, characterized by hot summers, cold winters, and frequent southwesterly winds. Normal annual precipitation is nearly 16 inches with snow generally comprising 50%. Vegetation consists of riparian cover in the bottom lands, and grass/sagebrush and conifer/aspen communities at higher elevations. Bottomlands are quite productive and the majority of the drainage is privately owned and is grazed by cattle and sheep. Extensive phosphate reserves lie in the vicinity of the Blackfoot River. Several mineral leases actually encompass major tributaries, and future activity and potential impact will have to be monitored closely. Waters of the river and tributaries are quite productive and no single chemical is believed to limit fish production. Blackfoot Reservoir was formed in 1909 behind a 50-foot high rockfill dam 78 miles above its confluence with the Snake River. The reservoir covers 20,000 acres at a maximum depth of 38 feet, and drawdown for irrigation usually begins in May or June. The reservoir begins refilling through winter and rapidly reaches capacity during spring runoff in April.

HISTORICAL PERSPECTIVE

Wild Cutthroat

Yellowstone cutthroat is the native trout in the Blackfoot System and probably migrated to and from the Snake River prior to construction of Blackfoot Reservoir. The population adapted well to reservoir conditions, however, and an adfluvial (migrations from river to reservoir and return) population developed above the dam.

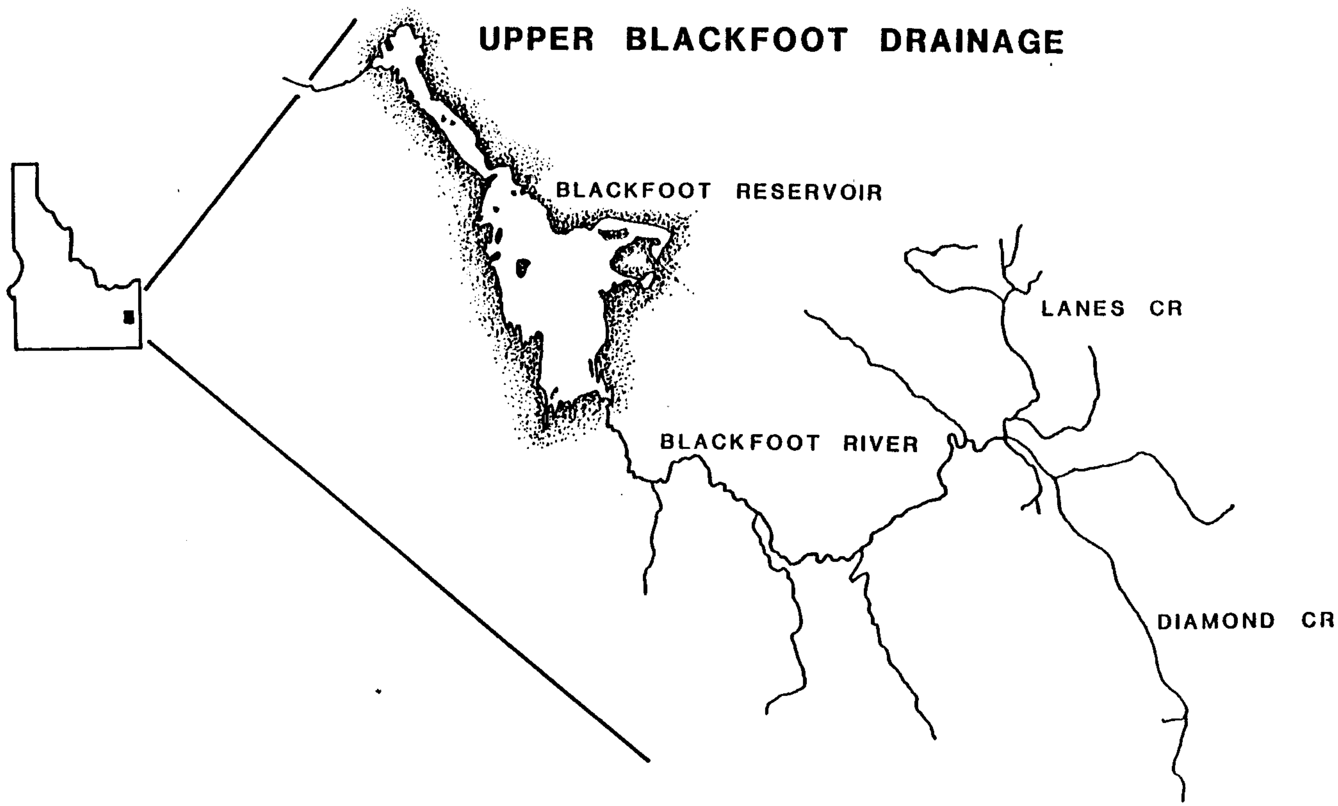

Figure 1. Location of the Upper Blackfoot River drainage, Caribou County, Idaho.

Mature cutthroat trout ascend the Blackfoot River from the reservoir during March, April, and May, and spawn in headwater tributaries in May and June. Trout re-enter the river after spawning and most reach the lower river or reservoir by the end of August.

Juvenile cutthroat rear in tributaries and in the river for periods of less than one year to three years. Most juveniles move downstream to the reservoir primarily during spring runoff, at 5-10 inches in length, where they rear and mature at ages-4, -5, and -6.

Despite the large number of non-native cutthroat planted in the system, only genetic material of native trout was present in cutthroat in the upper tributaries in 1980.

Habitat has continued to decline on the Blackfoot River and tributaries, but not as rapidly as one might have expected during the past 30 years. Condition of some reaches of streams have declined significantly, while others have actually improved during the period 1958-88 (Paul Cuplin, personnal communication). The overall condition, however, is one of decline. Even though quality of habitat is being depressed, Cuplin felt that it had not changed enough to account for the collapsed cutthroat fishery.

Fisheries

The Blackfoot River supported a popular fishery through the 1940s, with the first major increase in effort apparently resulting from the arrival of the Monsanto Company in Soda Springs in 1951. Though pressure on the river appeared to increase markedly through 1957, the quality of the fishery remained outstanding. Records of the Caribou County Sun list numerous verified catches of cutthroat weighting 5-8 pounds. The first detailed fishery investigation on the river estimated average harvest for the 1958-59 seasons at 14,500 cutthroat. Although roughly equal numbers of juveniles and spawners were harvested in those years, cutthroat in the creel averaged 14 inches. Of that harvest, 45% of the trout exceeded 16 inches, and a striking 20% topped 20 inches in lengthl

In sharp contrast with the river fishery, Blackfoot Reservoir remained virtually unexploited until the early 1960s. During the 1950s, limited numbers of boat anglers began fishing the reservoir and catches of cutthroat up to 10 pounds were recorded. Even though interest in the reservoir fishery increased through the 1950s, the majority of effort was expended by bank anglers. Relatively light pressure on the reservoir where wild cutthroat matured was probably the major factor allowing persistence of the trophy cutthroat fishery on the river under the liberal bag limits of that time.

Despite the popularity of the Blackfoot River fishery, the presence of large, nongame fish populations, especially Utah sucker and carp, had long been considered a detriment to cutthroat trout. Spawning suckers had been trapped on the Blackfoot River since 1943 (up to 373,000 pounds annually), but the population remained intact. The perceived problem of continued abundance of sucker and carp prompted the Department to treat the reservoir with toxophene on October 3-4, 1961. Test segments of Angus, Trail, Slug, and Dry Creeks, and approximately 25 miles of the Blackfoot River below the upper Allen Ranch diversion, were treated with rotenone on October 8. The treatment project did not eliminate carp or sucker from the system nor did it destroy the native cutthroat. At least 66% of the river population of wild cutthroat in 1961 (primarily juveniles) remained alive above the treated waters, though larger, mature fish in the lower river and reservoir were mostly lost. A small number of large, wild cutthroat were observed spawning in Spring Creek in 1962, as evidence that some mature fish were not poisoned.

The reservoir fishery underwent major changes during the years following treatment. Rainbow trout were established and comprised the majority of fish caught on the reservoir. More importantly, a major increase in boat fishing resulted from media attention to the treatment and restocking and to the development of access sites and boat ramps. As a result, boat counts increased from 50 on the opening day in 1963 to over 700 in 1966. Quality of fishing in the reservoir fluctuated substantially during the late 1960s and 70s, with seasonal catch rates ranging from .45 to .10 fish/h.

Despite the eradication project, the wild trout fishery in the Blackfoot River continued to produce some large fish for several years, but declining harvest and size of fish in the mid-1970s and beyond appeared to mark a turning point in the fishery. Fishing effort on the river was 19,000 hours in 1978, similar to that in 1960, but had declined to just over 4,000 by 1988 (Figure 2). Harvest of wild cutthroat trout by anglers in 1988 was 1/6 of that ten years earlier, and 1/16 of the average for the 1959-60 seasons (Figure 3). Harvest rates declined over this period as well. Collapse of the river fishery was also evidenced by declining numbers of adults in tributary spawning grounds.

While boat angling on Blackfoot Reservoir has probably been somewhat stable over the past ten years at around 80,000 hours annually, effort expended by shoreline anglers has apparently increased. Corresponding to other information, aerial counts of cars on opening day of the shoreline season increased from 107 in 1977 to 375 in 1988 (Figure 4).

In addition to stocking rainbow trout in the reservoir, the Department initiated the Bear Lake cutthroat program in 1983. Approximately 1,300,000 fingerlings had been released in the Little Blackfoot River by 1988. Some Bear Lake cutthroat appeared in the creel in 1984, and they comprised a large portion of the catch in 1985 (44%) and 1986 (56%). Even though Bear Lake fish dominated the reservoir trout harvest in 1986, their survival to maturity appeared to be low. The program has been difficult to evaluate in the past two years because planting numbers and estimates of angler effort have been inconsistent. Survival of eggs taken from spawners in the little Blackfoot River has also been low, presumably from poor water quality and high temperatures.

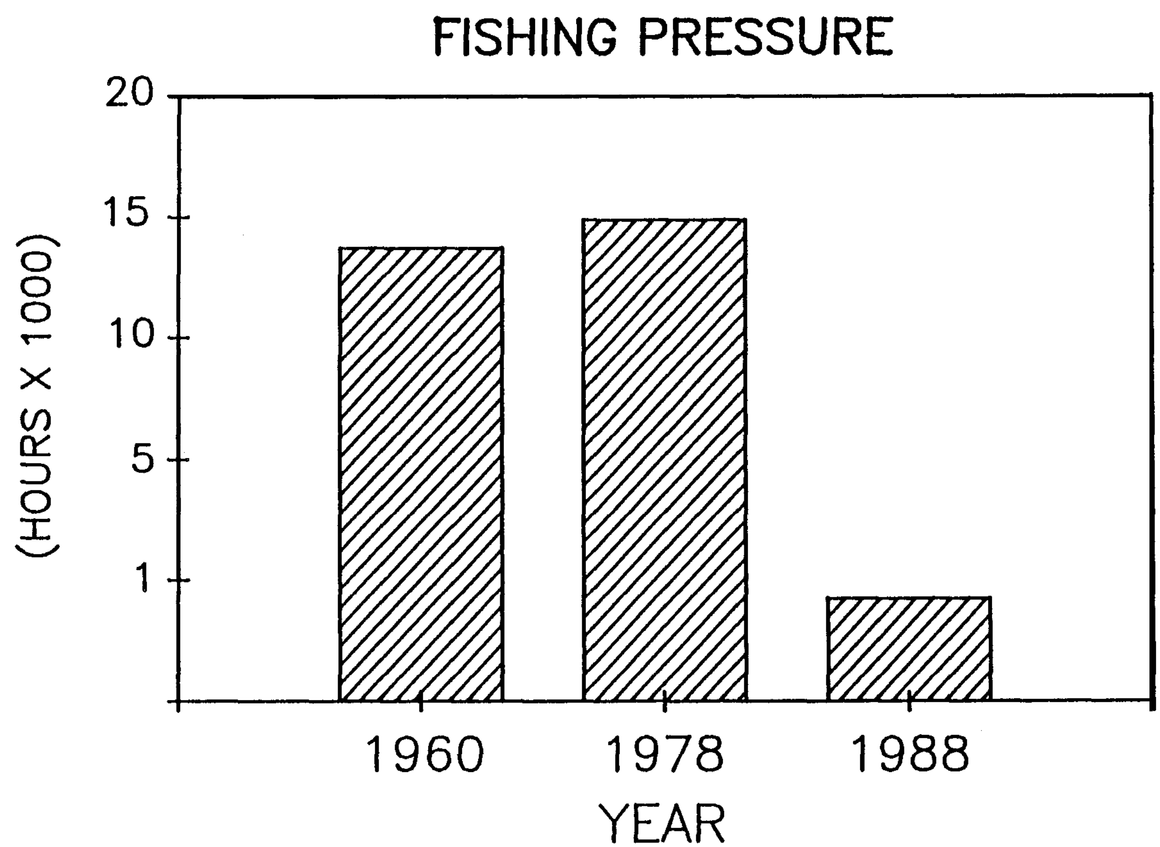

Figure 2. Hours of fishing pressure expended on the Upper Blackfoot River, Caribou County, Idaho, in 1960, 1978, and 1988.

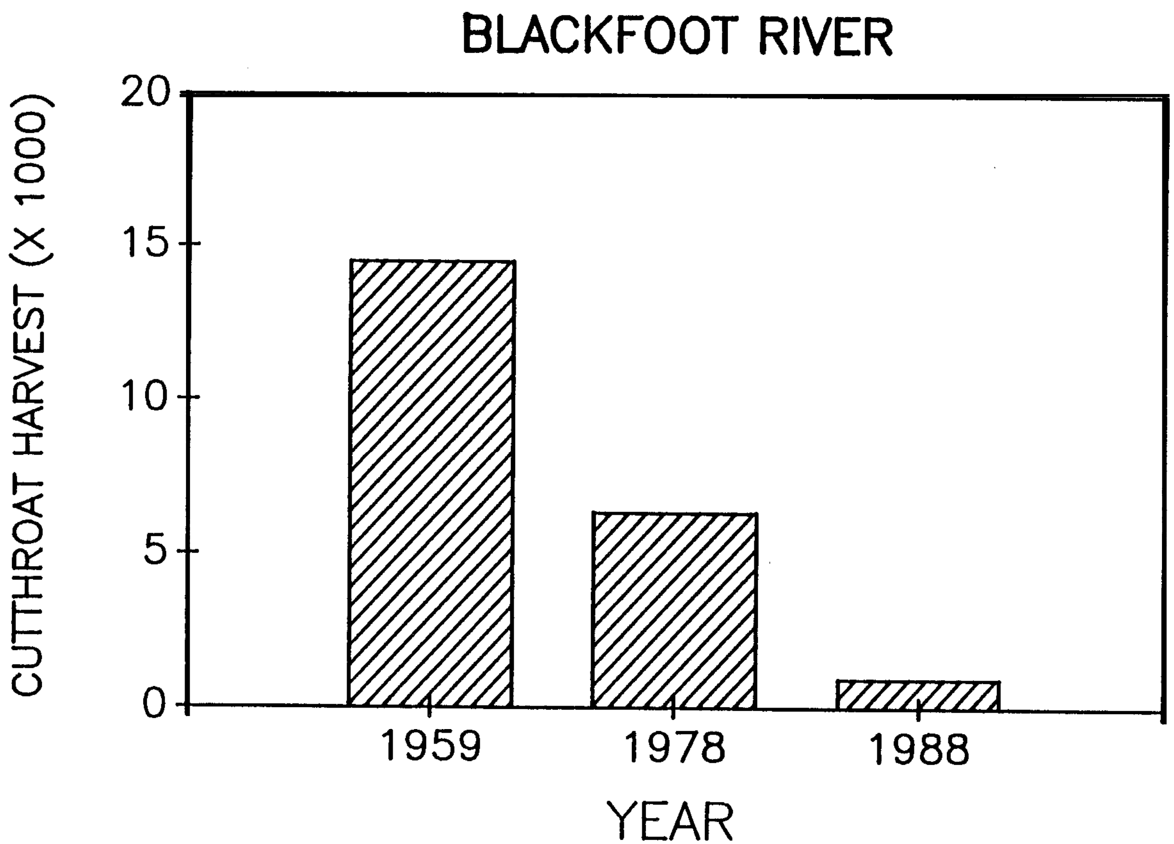

Figure 3. Harvest of wild cutthroat trout on the Upper Blackfoot River, Caribou County, Idaho, in 1959, 1978, and 1988.

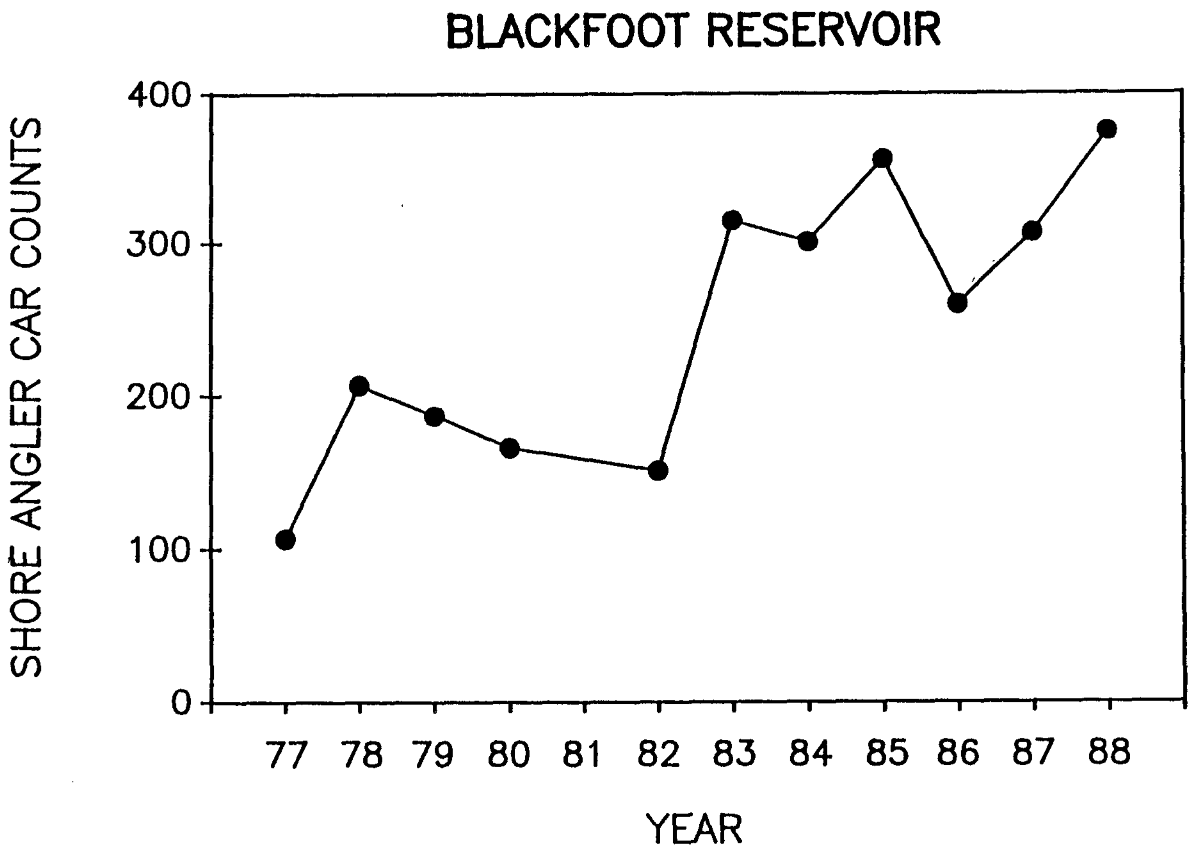

Figure 4. Opening day car counts as an index of the number of shore anglers on Blackfoot Reservoir, Caribou County, Idaho, 1977-1988.

Rainbow trout in the reservoir currently comprise 40 to 70% of annual trout harvest. Although rainbow in the creel average 14 inches, their return rates also appear to be low. Wild cutthroat trout currently make up 5% of reservoir trout harvest.

PROGRAM GOALS AND STRATEGIES

Blackfoot River

Wild, Native Cutthroat Trout

Management Goal:

> Restore the river fishery on native Yellowstone cutthroat trout to catch rates and age and size composition similar to those prior to 1960 (0.7 fish/h, with 20% of the catch over 20 inches in length).

Strategy 1: Regulations.

Important factors must be considered when developing regulations to restore the wild cutthroat fishery on the Blackfoot River. Cutthroat spend nearly equal parts of their lives in the river and in Blackfoot Reservoir. Any regulation designed to restore cutthroat trout must reduce harvest in the river and on the reservoir where the high boat-angling pressure has impacted the traditional river fishery. A certain level of regulation is first required to meet the catch rate and average size goal. The length of time required to rebuild the fishery to that level is the second determinant of regulations required. A significant factor not built into the evaluations is that a given regulation may not produce the same quality of fishing in the future as it would today. Fishing pressure is bound to increase as the quality of angling rises, and more restrictions may have to be implemented to maintain the desired average size and catch rates.

While there is ample opportunity for making errors in judging the effect of regulations on a population in absolute terms, comparison of the relative influence of a wide range of regulations is quite useful. Recovery of the wild population was analyzed under twelve combinations of regulations for the river and reservoir fisheries (Table 1).

Table 1. Combinations of fishing regulations evaluated for the Blackfoot River and Reservoir wild cutthroat trout fisheries.

	REGULATIONS	
Simulation	River	Reservoir
S1	Catch-and-Release -A measure of maximum population growth	
S2	16 minimum size	catch-and-release[1]
S3	12 minimum size	catch-and-release
S4	8" to 14" slot	catch-and-release
S5	8" minimum size	catch-and-release
S6	16 minimum size	16" size
S7	12 minimum size	16" size
S8	14 minimum size	14" size
S9	10 minimum size	14" size
S10	12 minimum size	12" size
	"	minimum
S11	catch-and-release	no minimum size
S12	16" minimum size	no minimum size
S13	12" minimum size	no minimum size

[1]Catch-and-release regulations include estimates of hooking mortality.

Catch-and-release for wild cutthroat trout on the river and reservoir (Si) provided the most dramatic increase in average size of cutthroat caught, as one would expect. Providing the opportunity for limited harvest of fish over 16 inches on the river (S2) resulted in a lower, but still highly acceptable, average size of nearly 18 inches (Figure 5). Moderate relaxation of size limits on the river to an 8- to 14-inch slot (S4), while still releasing fish on the reservoir, nearly doubled harvest, but mean size of cutthroat harvested dropped to less than 14 inches. As more liberal regulations were evaluated, allowing harvest of wild cutthroat on the reservoir (16-inch minimum size on river and reservoir, S9), total harvest begins to decline to levels unacceptable to anglers. Average size and harvest of cutthroat trout would decline below currently poor levels if regulations became more liberal than S9.

We estimated time required for the fishery to recover from current to target status under each regulation to help anglers establish realistic expectations for each. Establishing recovery times also helps determine when field evaluation of the regulation should be implemented. Population growth curves were drawn for the five combinations of regulations to demonstrate a range of progress that could be expected (Figure 6). Under catch-and-release, eight years is required to reach the same population levels observed in the 1970s. Once cutthroat numbers are on the rise, however, it only takes an additional five to eight years to provide fishing on the river similar to that in the 1950s. The 16-inch minimum size and the 8- to 14-inch slot on the river provide harvest opportunity for cutthroat and still allow acceptable recovery times. The 8- to 14-inch slot may not meet targets for cutthroat size, however. The rebuilding interval for regulations allowing wild cutthroat harvest on the reservoir (16-inch minimum size on river and reservoir S6, and 10-inch minimum size on river, and 14-inch minimum size on the reservoir S9) took nearly 20 years just to reach conditions of the 1970s. Additionally, these regulations may never provide the quality of fishing found on the river in the 1950s (management goal).

The striking feature of the regulation options was the tremendous impact on population recovery exerted by nearly any level of harvest of wild cutthroat on the reservoir. Even the harvest of only those fish over 16 inches on the reservoir restricted population recovery to only one-fifth of potential under catch-and-release. Release of wild cutthroat caught on the reservoir resulted in far more dramatic population restoration, even with varied levels of harvest on the river. While catch-and-release for wild cutthroat on the reservoir may sound overly restrictive, anglers would currently be releasing only 1 in every 20 trout caught.

Restriction of bait and barbed hooks on the Blackfoot Reservoir fishery provided only very negligable improvement in survival of released cutthroat. Boat anglers on the reservoir harvested 92% of all wild cutthroat creeled in 1979 and predominantly used lures (72%) in the tight-line troll fishery. Eighteen percent used lure/bait combinations, and only 10% of all boat anglers fished exclusively with bait. Teaching anglers how to properly release fish, in conjunction with an already low

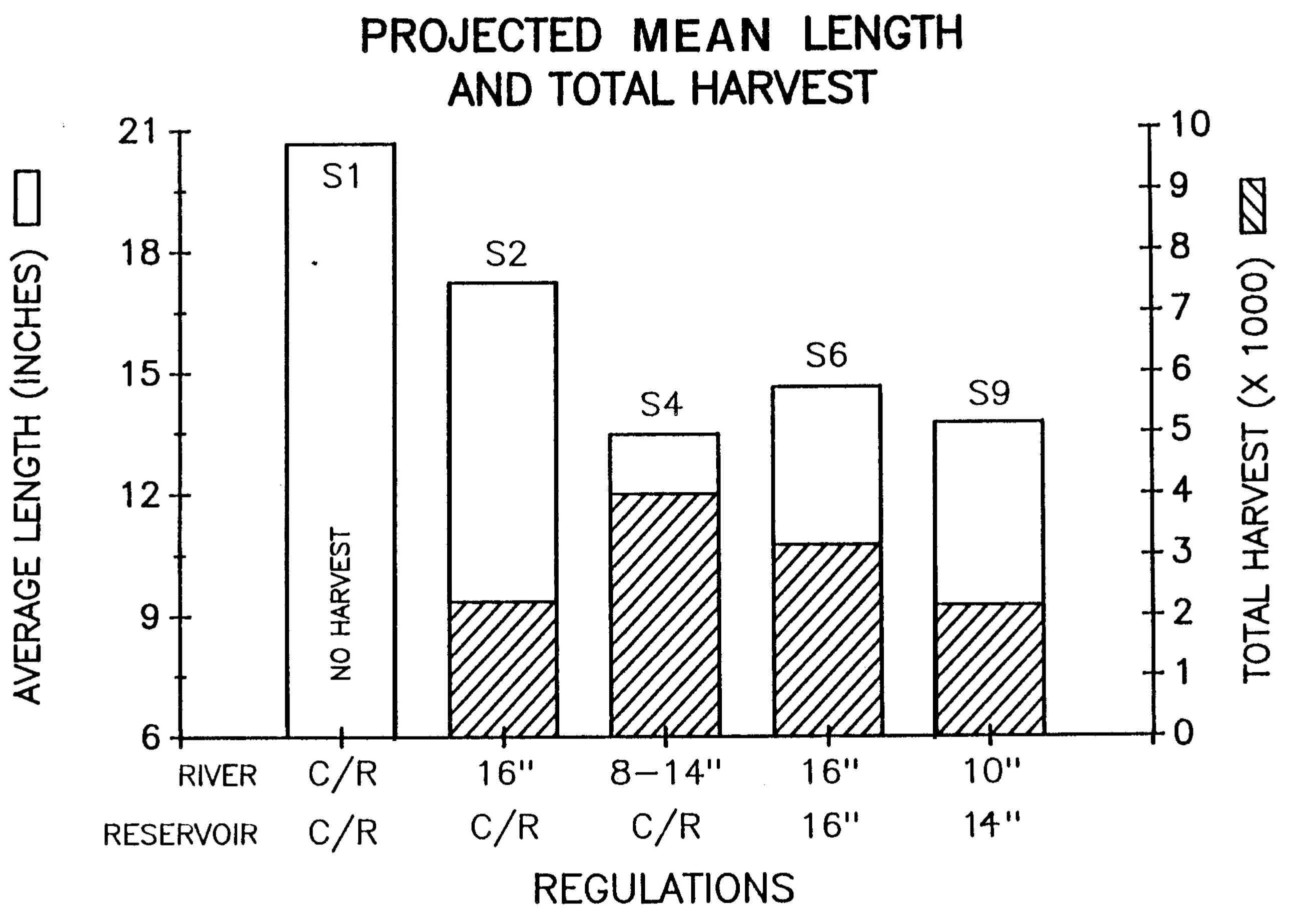

Figure 5. Average length and total harvest of wild cutthroat trout projected after 20 years under five combinations of regulations on Blackfoot River and Reservoir, Caribou County, Idaho. C/R is catch-and-release, 16" and 10" are minimum sizes, and 8-14" is a slot limit. Bag limit under projections was 2/day.

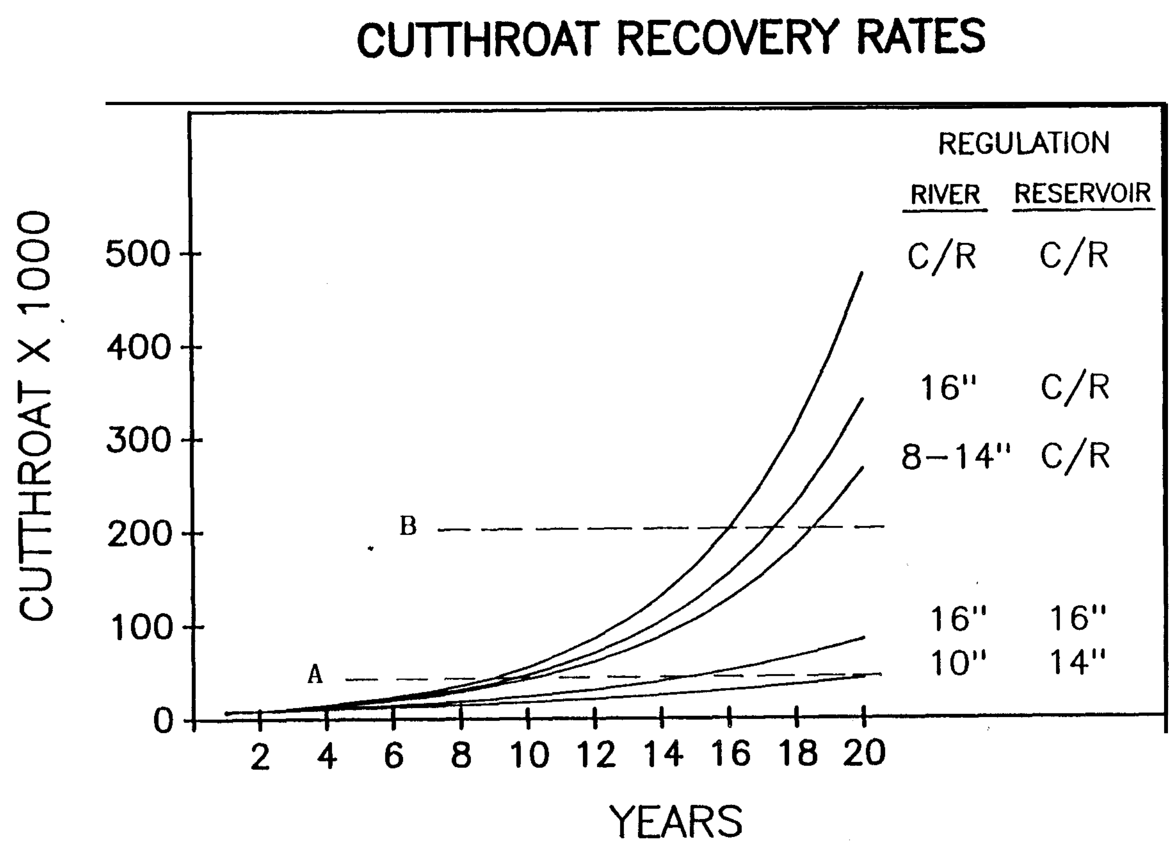

Figure 6. Populations growth curves projected for wild cutthroat trout under five combinations of regulations for the Blackfoot River and Reservoir, Caribou County, Idaho. C/R is catch-and-release, 16" and 10" are minimum sizes, and 8-14" is a slot limit. Bag limit under projections was 2/day. Approximate population levels of the late 1970s and 1950s are represented by lines labeled A and B, respectively.

incidence of bait fishing by boat anglers, negates the need for bait and gear restrictions on the reservoir. A bait restriction on the reservoir would severely reduce fishing success for shoreline anglers who use predominantly bait but catch only 8% of wild cutthroat harvested.

Restrictions on gear and bait on the Blackfoot River did not markedly reduce overall cutthroat mortality because of the current low fishing pressure on the river. The river supports a tight-line fishery for cutthroat, and this, in conjunction with incentive programs designed to encourage bait anglers to cut lines on deeply hooked fish, may offset the need for restrictions in the future. It may also be counter-productive to eliminate bait, especially in the lower river above the reservoir, where we may be trying to develop a fishery on hatchery rainbow. Hooking mortality may become more significant on the river in the future, however, as fishing quality and resulting pressure increases.

Strategy 2: Habitat enhancement.

Considering the current low numbers of wild cutthroat trout, and the length of time projected for their recovery, some form of hatchery enhancement of the wild stock may be justifiable. Effectiveness of releases of wild fry should be evaluated and an experimental program developed before larger-scale production is undertaken. Most literature and unpublished information indicates that a 2- to 5-fold increase in cutthroat survival from egg to fry is reasonable. If benefits in this range were realized, spawning and releasing fry from 30-40 females could increase numbers of one-year-old cutthroat by up to 25% from current levels. Part of the evaluation of the feasibility of this program would include identification of available hatchery space, although enough is currently on line for a pilot program.

Strategy 3: Habitat improvement.

Improvement of important spawning streams early in the project will provide more quality spawning substrate which will help accelerate rebuilding of the population through higher egg to fry survival. Even though spawning and rearing habitat for cutthroat in the Blackfoot system is well below full seeding, there are several advantages of initiating habitat improvement projects early in the program. Benefits of habitat projects such as riffle sifting, structure placement, and fencing are often not realized for several years after project completion. Work done now will provide quality habitat for cutthroat as the population expands to use the entire drainage.

Spring Creek was historically a tremendous producer of wild cutthroat and is currently in poorer condition than was the case just ten years ago. The Bear Lake Cattleman's Association owns land on Spring Creek and also on Sheep Creek, another historically important producer. An initial improvement project on Spring Creek will be pursued for implementation in

1990, but the groundwork with landowners must be laid first. It will be important for the Department to develop habitat programs that benefit the landowner and his operation as well as wild cutthroat trout. Once workable projects have been developed, they will expand to other tributaries in the basin.

An additional habitat project would involve the restoration of the river to its natural channel along a reach near the Dredge property. The channelized reach currently has no fishery potential, but the original channel is still intact and maintains a small amount of water with good willow growth on the banks. This program would create another 2.2 miles of fishery below the lower narrows where habitat is limiting. As with other habitat projects in the basin, the relationship with landowners must first be developed before progress will be made.

Increasing Harvest Opportunity

Management Goal:

> Provide more harvest opportunity in the lower Blackfoot River above the reservoir consistent with public demand and the goal of wild cutthroat restoration (trout harvest rate of 0.5 fish/h).

Strategy 1: Assess demand for additional harvest opportunity.

Increased opportunity for harvest of hatchery trout on the lower Blackfoot River, above the reservoir, may be necessary to offset the short-term reduction in harvest of wild cutthroat trout. We will assess angler needs and attitudes regarding harvest opportunity on catchable rainbow trout during public meetings and creel census contacts in 1989. Hatchery rainbow trout are not expected to replace wild cutthroat trout for most anglers, but they may provide important alternative harvest opportunity during the cutthroat rebuilding program.

Strategy 2: Implement catchable rainbow trout stocking program.

Stocking of catchable rainbow trout in the Blackfoot River was eliminated in recent years because of concerns regarding hybridization with wild cutthroat trout upstream. The lower narrows appeared to define the upper boundary of rainbow trout movement, however, according to extensive sampling done in the late 1970s. Rainbow trout released in the river would also be fall spawners which would help minimize their interbreeding with spring-spawning, wild cutthroat trout higher in the drainage. While cutthroat trout were in low numbers throughout the system, they were virtually non-existant below the lower narrows in 1988.

Access to the lower river is limited and has apparently been a problem at times in the past. One of our primary concerns is how that might influence return-to-the-creel of stocked rainbow trout. Angler access will be discussed in the following strategy item. Depending on public demand, 5,000 rainbow trout would be stocked in the river in 1990 below the narrows at 2,000 initially, with an additional 1,000 added every three weeks. Trout would be distributed throughout a specified "hatchery trout management zone," and 20% of the fish in each release would be tagged to evaluate return-to-the-creel.

Continuation of the program would depend on public satisfaction, adequate return-to-the-creel, and the restriction of catchable trout below the lower narrows. Return-to-the-creel would be evaluated for at least two years to monitor the lag time in anglers responding to the program. Sampling higher up in the drainage will detect potential upstream movement of catchable rainbow trout.

Strategy 3: Develop angler access on the river.

In contrast with most trout fisheries in the state, the vast majority of fishing on the upper Blackfoot River occurs on private ground. The fishery is even more unusual in that seven families control access to approximately 35 miles of the mainstem and the majority of tributary mileage. It is very clear that a successful landowner relations program must be a major consideration in developing the fishery. During the next year, we will visit each major landowner and discuss the basic outline of the plan. Walk-in access has not been recently denied to anglers, but we need to alert landowners that fishing pressure may be increasing. This will be especially important for the Corbidge, Conlin, and Dredge families, since the hatchery rainbow trout program relies on public access across their lands.

The initial program will involve both signing and pamphlet distribution to highlight landowner-sportsman relations. Anglers have to be made aware that even walk-in access is a privilege that can be lost through discourteous behavior. Emphasis on developing additional access will be delayed until we fully assess public need and anglers can demonstrate to landowners respectful use of private ground.

Blackfoot Reservoir

Increase Harvest Opportunity

Management Goal:

Provide additional harvest opportunity on Blackfoot Reservoir on Bear Lake cutthroat and rainbow trout (at 0.7 fish/h during June and July, with 0.4 fish/h over the season) through improvement of release strategies and stocking rates. Also evaluate the potential to provide a fishery during the mid-summer, diversify opportunity and improve overall catch rates for shoreline anglers.

Strategy 1: Improve harvest rates for hatchery rainbow trout.

The catchable rainbow trout program has provided the mainstay of the reservoir trout fishery for over 20 years. They exhibit tremendous growth in the system and have often comprised 80% of total harvest. We currently have not documented their survival and ultimate return-to-the-creel, but we feel that it has been poor. Catch rates have also been low at 0.3 fish/h during June, with 0.15 fish/h over the season. One option that will be explored is the use of fingerling rainbow to improve fishing. We can release great numbers of large fingerling rainbow (6 inches) in October that may survive at a good enough rate to provide higher catch rates the following summer than do lower numbers of spring-stocked catchables. Quality of trout from fingerling releases would also be much greater than that of catchables. Additionally, use of fingerling trout would offer more flexibility in choice of strains to use in the reservoir. Since fingerling trout are much less expensive to produce, stocking rates will be increased in an attempt to bolster catch rates. Capacity of the reservoir to produce more fish at good growth rates will also be evaluated at these higher stocking rates.

Strategy 2: Increase harvest rates and provide better egg production on Bear Lake cutthroat trout.

Bear Lake Cutthroat Fishery

Since its inception, the Bear Lake cutthroat program has been a popular project with Blackfoot Reservoir anglers. Enthusiasm for the fishery continued to increase as the large-size cutthroat trout entered the creel in 1987-88. Although overall catch rates on the reservoir have doubled as a result of the program, return-to-the-creel seems to be especially low and will be better estimated during the 1989 creel census. We will vary stocking strategies over the next several years in an effort to improve survival and monitor the effect in the fishery and in return of spawners.

Some discussion has been generated regarding the trophy vs yield goals that should guide regulation of harvest of Bear Lake cutthroat. Since growth rates are good, mortality appears to be high, and they attain large size before general harvest (14% over 20 inches), current regulations seem to be a logical choice.

At projected stocking rates (400,000 per year), Bear Lake cutthroat will continue to be the dominant trout fishery on the reservoir. Bear Lake fish have already produced up to 602 of overall harvest and the trend will continue unless rainbow stocking rates can also be increased. All Bear Lake cutthroat trout will be adipose-fin clipped to allow anglers to identify wild cutthroat trout to be released.

Bear Lake Cutthroat Egg Program

The Bear Lake cutthroat program was established on Blackfoot Reservoir to provide a statewide source of eggs in addition to the fishery. The run was established in the Little Blackfoot River to minimize interbreeding with wild cutthroat, but the program there has been plagued by poor egg survival rates. Low egg survival probably results from high water temperature and poor water quality. Return of adults and survival of eggs would be much greater if the run was transferred to the Blackfoot River. Construction of a floating weir in the lower river above the reservoir would prevent Bear Lake cutthroat from moving up the drainage, and would provide an excellent tool for monitoring numbers of adult wild cutthroat running to the river each year.

An additional benefit of moving the Bear Lake cutthroat run is that adult fish will be in much better condition after spawning and could be stocked-out in alternate waters to provide a subsequent fishery. A potential location would be Dike Lake. Harvest rates would be much greater on these fish in the small system than on Blackfoot Reservoir, and they would diversify opportunity considerably.

Strategy 3: Evaluate potential for smallmouth bass introduction.

The typical pattern of seasonal fishing effort on Blackfoot Reservoir is a strong peak in the spring, a rapid decline in July which lasts through September, followed by another smaller peak in October. Good fishing for trout is nonexistent during the mid-summer and early fall, due to high water temperatures. Smallmouth bass could provide a fishery during these "slow" months, would diversify angling opportunity, and increase overall catch rates for shore anglers.

The primary concern regarding their introduction is the potential for impacting wild cutthroat trout. Based on public comment, habitat measurements on the reservoir, and on published information regarding potential impacts, we will evaluate the appropriateness of their introduction. The assessment of angler support and potential biological impact will be rigorous considering the possible magnitude of negative impacts and the irreversible nature of exotic introductions.

JOB PERFORMANCE REPORT

State of: **Idaho**

Name: **REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS**

Project No.: **F-71-R-11**

Job No.: 5-d

Title: **Region 5 Technical Guidance**

Period Covered: **July 1, 1987 to June 30, 1988**

ABSTRACT

Considerable time was spent reviewing proposals and developing comments on activities that influence fish and fishermen populations. The usual time was spent with personnel of various agencies coordinating hydropower, mining, timber, roading, stream alteration, grazing allotments, National Pollution Discharge Elimination System (NPDES), fill and excavation, and other projects.

Author:

Larry La Bolle
Regional Fishery Manager

OBJECTIVE

To provide technical guidance to public and private individuals and groups on matters pertaining to fisheries management in Region 5.

FINDINGS

Water Right Applications

We reviewed our water right application for the proposed Shelley hydroelectric project on the Snake River.

Hydropower Licensing (FERC)

We commented on eight hydroelectric projects during the past year. Those requiring a major time commitment were on the Shelley reach of the Snake River and in the Bear River narrows upstream from Preston. Both projects involved several field tours, associated permit review, impact assessment and mitigation plan development. Comments on other projects were miscellaneous pertaining to requirements at various stages of licensing.

Stream Alterations (Water Resources)

We commented on 17 stream alteration permit applications. Activities ranged from those associated with mining, hydropower, timber harvest, and road building to irrigation and city sewer projects.

Forest Projects

We worked with personnel from the Caribou National Forest on the following activities: Simplot Slurry line routing, road closures on the Pocatello District, Phosphate Ore hauling on the Blackfoot River road, three phosphate mines, and on several grazing allotments.

BLM Projects

A large block of time was spent addressing problems in the Food, Machine and Chemical Company (FMC) Dry Valley Mine environmental assessment (EA). We requested several changes in the mine plan, the most significant of which was the adoption of a fisheries and habitat monitoring program. This is the first time a phosphate mining company has monitored anything except turbidity in associated streams in the southeast Idaho phosphate field. Comments were also made on two additional mine plans and several lease adjustments.

Department of Lands

Comments were made on eight applications through the Department of Lands.

EPA

We commented on eight NPDES permits around the region for seven cities and one industrial concern.

ACKNOWLEDGEMENTS

We would like to thank Jim Mende, Tom Curet, and Terry Ratzlaff, all of whom spent long hours in the field during data collection efforts. In addition, a number of Conservation Officers and staff personnel, including Tom Lucia, Larry Jindrich, John Levesque, Wes Cannon, Larry Hlavaty, Cecil Brown, Dave Neider, Bob Saban, John Heimer, Al Van Vooren, and Chris Bocek, assisted in fish sampling efforts during the field season. Cheryl Hardy typed the manuscript with the help of her trusty Rosetta (Schill) Stone.

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APPENDICES

Appendix A-1. Average back-calculated lengths-at-age (mm) and average annual growth increments for largemouth bass in Winder Reservoir, Franklin County, Idaho, May 1988.

Class	N	$\bar{x}$ length at capture	Annulus 1	2	3	4	5	6	7
II	68	169	68	169					
III	13	221	80	186	221				
IV	23	276	81	143	220	277			
V	17	288	80	146	204	253	288		
VI	8	322	101	180	227	269	294	323	
VII	3	370	90	176	251	299	332	351	370
Weighted Mean Length			76	164	218	269	295	331	370
Number of Fish			132	132	64	51	28	11	3
Standard Error of Length-at-Age			1.6	2.5	4.2	4.6	7.8	21	60
Increment of Growth			76	88	60	51	32	25	18

R9R5APPA1

Appendix A-2. Average back-calculated lengths-at-age (mm) and average annual growth increments for largemouth bass in Condie Reservoir, Franklin County, Idaho, May 1988.

Age Class	N	$\bar{x}$ length at capture	Annulus 1	2	3	4	5	6	7	8	9	10	11	
III	14	214	112	173	214									
IV	43	253	122	176	225	253								
V	18	303	133	200	245	280	303							
VI	15	332	127	184	248	281	313	332						
VII	13	383	135	202	267	312	344	367	383					
VIII	7	432	150	210	284	339	373	396	416	432				
XI	6	435	145	202	250	294	334	365	396	419	435			
X	1	496	153	212	277	325	359	433	455	475	483	496		
XI	3	522	153	199	239	283	332	382	426	455	483	501	521	
XII	1	465	132	192	228	275	301	315	344	378	405	426	449	465

	1	2	3	4	5	6	7	8	9	10	11	
Weighted $\bar{x}$ Length	129	188	239	278	327	361	398	431	450	485	503	465
Number of Fish	121	121	121	107	64	46	31	18	11	5	4	1
Increment of Growth	129	59	52	36	31	26	23	22	20	17	22	15
Standard Error of Length-at-Age	2.0	3.0	2.2	1.5	1.7	2.3	2.2	2.6	3.2	1.4	9.1	0.0

Appendix A-3. Average back-calculated lengths-at-age (mm) and average annual growth increments for largemouth bass in Twin Lakes Reservoir, Franklin County, Idaho, May 1988.

Age Class	N	$\bar{x}$ length at capture	Annulus 1	2	3	4	5	6	7	8	9	10	11
III	4	210	143	175	210								
IV	14	225	121	170	199	225							
V	28	244	117	162	194	221	244						
VI	36	303	133	189	229	261	285	303					
VII	32	384	137	200	268	317	344	367	384				
VIII	17	411	133	194	256	316	352	378	397	411			
XI	13	456	142	220	276	327	373	403	426	443	456		
X	7	470	135	199	266	315	355	389	419	442	455	470	
XI	2	477	130	212	255	285	320	342	375	393	415	448	477
Weighted $\bar{x}$ Length			130	187	236	277	311	352	398	426	451	465	477
Number of Fish			154	154	153	149	135	107	71	39	22	9	2
Increment of Growth			130	57	48	40	29	23	20	16	14	19	28
Standard Error of Length at Age			1.4	2.5	3.8	4.7	5.3	5.7	5.1	5.5	6.7	12.0	

R9R5APPA3

Appendix B. Estimated angler hours expended on four Franklin County Reservoirs between May 28 and September 16, 1988 (95% Confidence Limits in parenthesis).

	Reservoir							
	Twin Lakes		Condie		Glendale		Winder	
Interval	Bank	Boat	Bank	Tube	Bank	Boat	Bank	Boat
I	3,588	6,229	948	2,269	677	2,019	1,937	474
	(1,737)	(3,687)	(-)	(-)	(308)	(672)	(773)	(175)
II	1,880	2,134	613	1,922	136	737	732	295
	(824)	(654)	(-)	(-)	(118)	(340)	(322)	(215)
III	941	1,243	182	871	994	1,176	355	101
	(316)	(395)	(93)	(292)	(201)	(301)	(160)	(140)
IV	1,135	1,623	173	646	643	1,090	564	402
	(424)	(582)	(92)	(199)	(250)	(627)	(354)	(201)
V	669	789	238	292	658	647	318	216
	(290)	(385)	(221)	(214)	(342)	(395)	(141)	(123)
VI	485	770	14	549	1,013	222	81	148
	(312)	(474)	(28)	(285)	(242)	(113)	(74)	(127)
VII	485	1,171	7	141	1,118	27	451	128
	(368)	(702)	(13)	(133)	(670)	(41)	(354)	(132)
VIII	692	707	0	0	1,125	84	282	128
	(521)	(692)	(0)	(0)	(597)	(82)	(338)	(150)
Total	9,875	14,666	2,175	6,690	6,364	6,002	4,720	1,892
	39%	61%	25%	75%	51%	49%	71%	29%

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Submitted by:

Daniel J. Schill
Regional Fishery Biologist

Larry D. La Bolle
Regional Fishery Manager

Approved by:

IDAHO DEPARTMENT OF FISH AND GAME

Jerry M. Conley, Director

Steven M. Huffaker, Chief
Bureau of Fisheries

Al Van Vooren
Resident Fisheries Manager